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IDAHO WATER SUPPLY PROGRAM EVALUATION

Environmental Protection Agency
Seattle, Washington

October 1973

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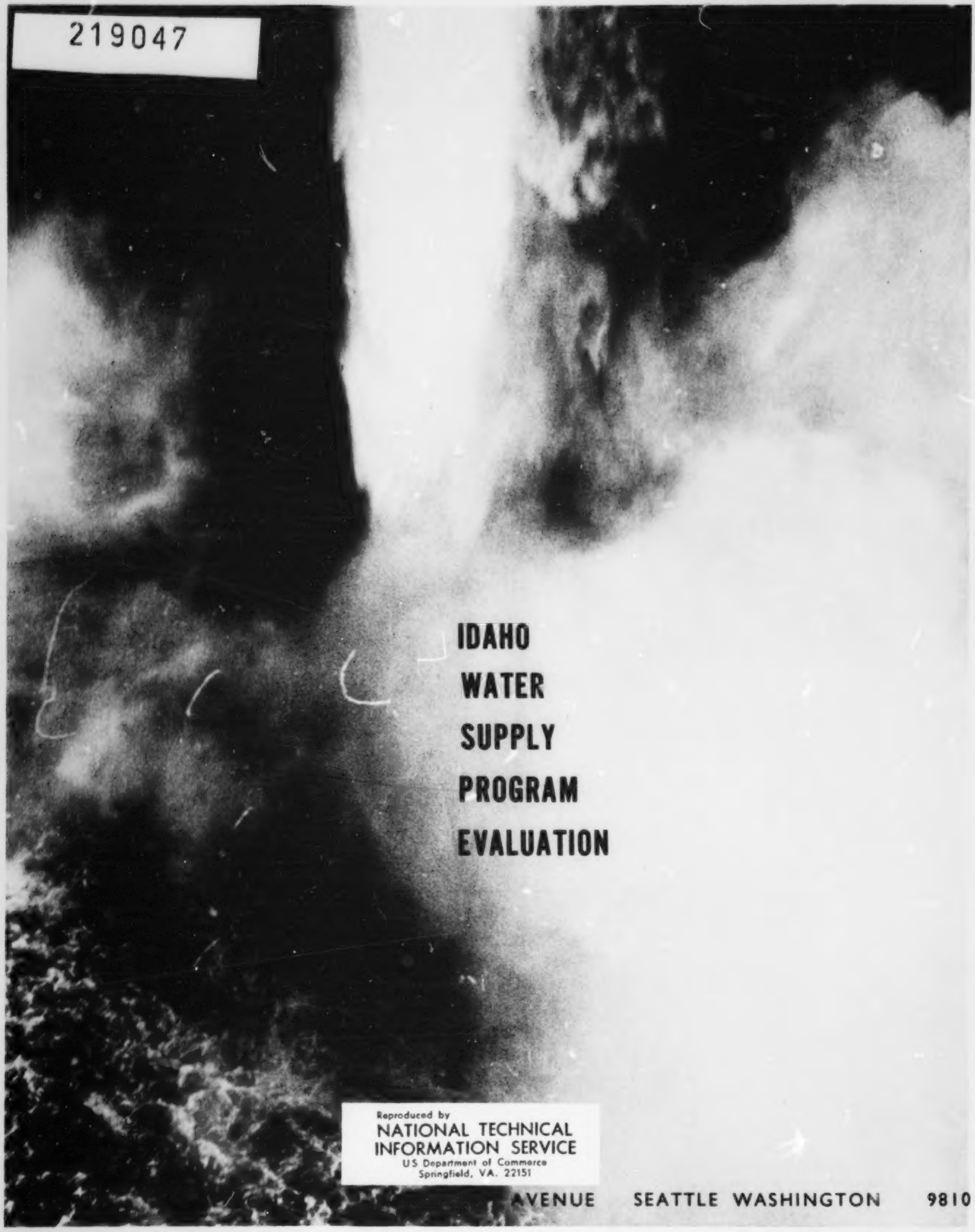

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IDAHO WATER SUPPLY PROGRAM

EVALUATION

EPA - 910/9-73-006

Water Supply Unit
Municipal Section
Air & Water Programs Division
Environmental Protection Agency
Region X

October 1973

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PREFACE

This report presents the Environmental Protection Agency's findings, conclusions and recommendations, with supporting data and explanatory text, resulting from an evaluation of the Idaho public drinking water supply program.

Field surveys to determine the adequacy of water system facilities, water quality, State laboratory facilities and operations, and overall water supply surveillance were conducted in late 1971 and early 1972. Additional information concerning legislation affecting the water supply program, recent organizational changes establishing the Department of Environmental and Community Services, and current manpower and funding expenditures for public water supply surveillance has been included.

Information contained in this report has been condensed and is further discussed in a companion report, Idaho Water Supply Program Evaluation - Summary. The Summary highlights important findings and principal needs of the State program for those who have an interest in Idaho's drinking water program but do not wish to study the details of the complete report.

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SUMMARY

Approximately 482,000 people in Idaho, or 68 percent of the State's population, are served by 274 public water supplies. The health of this segment of the population is directly affected by the quality of their drinking water, and under State law the Department of Environmental and Community Services is responsible for establishing requirements and providing surveillance of these supplies to assure safe drinking water. The State water supply program, therefore, has a significant impact on the health of a major portion of the State population.

Recognizing this, James L. Agee, Region X, Administrator, Environmental Protection Agency, when requested by the Honorable Cecil D. Andrus, Governor of Idaho, to assist in supporting Idaho's environmental program recommended as part of a total environmental program assessment package an evaluation of the State water supply program. Subsequent discussion in the fall of 1971 with State water supply program personnel resulted in establishment of an agreement for evaluation of the program. The effectiveness of the program was to be judged primarily on the basis of the adequacy of State statues, rules and regulations; examination of drinking water quality and condition of water treatment and distribution facilities in a representative 10 percent of the State's 274 public water systems; comparison of bacteriological and chemical water quality with the criteria of the 1962 Public Health Service Drinking Water Standards (1); and an overall evaluation of the water supply surveillance program.

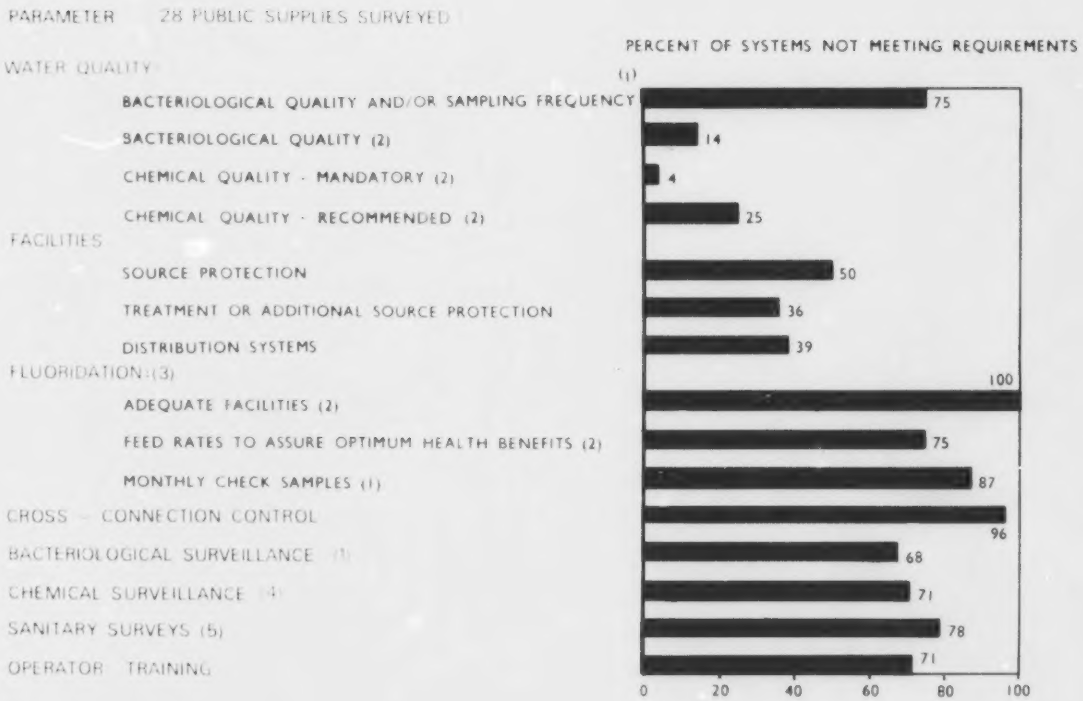
Principal findings and conclusions of the study follow.

WATER SUPPLY STATUS

The drinking water quality and the condition of the water supply treatment and distribution system facilities were determined from an evaluation of 10 percent of the total number of public water supplies in the State. The supplies surveyed were selected to provide a cross-section of the State's supplies from the standpoint of geographical distribution, type of source and type of treatment. These supplies provide drinking water to over 21 percent of the population served by public water supplies and the findings are judged to be representative of the overall conditions in the State. Water quality and system conditions data as determined from the supplies surveyed are described below and are summarized graphically in Figure 1.

Water Quality - Bacteriological

Seventy-five (75) percent of the public water supply systems evaluated either did not meet the bacteriological quality standards 2 or more months during the 12 month period prior to the survey, or



(1) DATA FROM PERIOD 12 MONTHS PRIOR TO SURVEY
(2) DATA FROM SAMPLES COLLECTED DURING SURVEY
(3) EIGHT FLUORIDATED SUPPLIES OPERATIONAL
(4) REQUIREMENT – CHEMICAL SAMPLE WITHIN 3 YEARS PRIOR TO SURVEY
(5) REQUIREMENT – SANITARY SURVEY WITHIN 1 YEAR PRIOR TO SURVEY

FIGURE 1 WATER QUALITY & SYSTEMS CONDITION SUMMARY

failed to collect sufficient samples during this same period to determine the bacteriological quality. Considering only those water samples collected during the survey, 18 percent of the supplies failed to meet bacteriological quality standards.

Water Quality - Chemical

While only four (4) percent of the public water systems examined did not meet mandatory chemical drinking water standards, twenty-five (25) percent did not meet one or more of the recommended chemical drinking water standards. The latter group of systems serve over 80,000 people.

Facilities

Fifty (50) percent of the supplies surveyed need improvements at the source and 36 percent need either additional treatment facilities or additional protection of the source of supply. Thirty-nine (39) percent of the supplies had either inadequate distribution system facilities or need improved operation of the existing facilities. Without these additions and changes, continuous production of safe drinking water may not be maintained.

An example of the impact of inadequate water distribution facilities on the health of community residents is a situation which existed in the south central Idaho community of Rockland in the late 60's and early 70's. Periodic outbreaks of summer dysentery were quite common during this period culminating with a widespread outbreak of gastroenteritis in June of 1970. An epidemiological investigation disclosed pathogenic organisms, including salmonella bacteria, in the drinking water. The apparent route of contamination of the water was from septic tanks discharging into a high ground water table which in turn found egress into the poorly maintained water distribution system in areas of low pressure. New sewage collection and water distribution systems were installed in addition to elimination of one badly deteriorated well and installation of chlorination equipment. With the advent of these changes summer "pip" outbreaks are now a rarity in Rockland.

Operator Competence

Twenty-nine (29) percent of the systems employ operators who have participated in water supply operators short course training. Many operators, although aware of their lack of knowledge in critical public health aspects of water supply operations, felt they could not be away from the job for even short course training.

Fluoridation

Fourteen (14) public water supply systems were reportedly fluoridating in 1971. None were found fully acceptable. Of the 14, only 8 fluoridation installations were in operation, the remainder having been discontinued for various reasons. Of the

8 facilities operating at the time of the survey, only two (25 percent) were fluoridating at a level high enough to assure dental health benefits. In addition, two supplies (25 percent) were fluoridating at a level above that recommended for optimum health benefits.

Cross-Connection Control

Only one supply surveyed had an adequate cross-connection control program to eliminate potential hazards from the distribution system. Fifty (50) percent of the supplies indicated having ordinances to require elimination of cross-connections but had implemented no program.

WATER SUPPLY PROGRAM

Legal Authority, Regulations and Standards

Basic health regulatory authority over public water supplies is provided in Idaho Code, Title 37, Chapter 21, Sections 37-2102 and 37-2103. Section 2102 provides that the owner or operator of a system providing water for domestic purposes shall keep it free from impurities, and that the State Board of Health shall promulgate standards for protection of the system from impurities and for water quality. Section 2103 specifies that failure to comply with the provisions of Chapter 21 is a misdemeanor.

The Environmental Protection and Health Act of 1972, creating the Department of Environmental Protection and Health, transferred the authority of the Board of Health and the Department of Health to the new agency. Provisions of the Act are included in Idaho Code, Title 38, Chapter 1. Sections 39-101 to 39-114 establisn statutory definition of a public water supply, provide for adoption of rules and regulations, empower the department to enforce standards, and provide for civil penalties. The 1973 Idaho legislature retitled the department the Department of Environmental and Community Services, revised the definition of a public water supply and added Section 39-118 requiring submission and approval of plans and specifications for construction or modifications of public water supply systems.

Title 39, Chapter 4, Section 39-414 of the Idaho Code provides that the District Boards of Health may administer and enforce all state health laws, regulations and standards, and all duties expressly delegated to them by the State Board of Health. In June 1971 the State Board of Health delegated to the seven Health Districts authority to enforce several state public health laws. Public water supply was not included in the delegation of authority.

The Idaho Code provides comprehensive administrative machinery for the aquisition of water rights to both surface and ground waters. In addition, Title 42, Chapter 2, Section 42-238 requires the adoption of minimum well construction standards to protect groundwater from contamination and the licensing of well drillers. Regulations adopted by the Department of Water Reclamation in 1968 require that public water supply wells shall also meet all State health agency requirements.

General regulations governing protection of public water supply were issued in November 1964. These regulations adopt the 1962 U.S. Public Health Service Drinking Water Standards and provide that water systems be maintained in accordance with these water quality standards. Additional standards cover design and construction of facilities for collection, treatment, storage and distribution of water for public use.

The enabling legislation and the 1964 rules and regulations are generally adequate to permit operation of an acceptable public water supply program. Elements necessary to improve the water supply program's operational and legal base are:

1. Updating the water supply regulations to reflect organizational changes, to require new and modified water quality and monitoring criteria, and to reflect improved water treatment and distribution practices,

2. Adopting legislation establishing a mandatory operator certification program, and

3. Adopting legislation establishing a program to assure coordinated development of public water supply systems.

Resources and Activities

Funds expended for public drinking water protection in Idaho have been inadequate to support a comprehensive program. The water supply effort in FY 1971 and FY 1972, including field work, administration and laboratory support, operated on a budget of approximately $91,000. This expenditure amounted to $330 per system or approximately 13 cents per capita. Total water supply funding increased to $124,000 in FY 1973, resulting in an annual expenditure of $450 per system or 17 cents per capita. Nationwide studies by the Environmental Protection Agency indicate that an adequate State drinking water program would require an annual expenditure of approximately $1000 per system or 22 cents per capita.

Total staffing for water supply activities during FY 1971 and FY 1972 was one man-year. The effort increased to 2.7 man-years in FY 1973 and improved the State's water supply surveillance activities. These staffing levels remain inadequate, however, and have contributed to the inability of the water supply program to fulfill its responsibilities.

Evaluation of the program activities in FY 1971-72 showed that many important activities were not being performed or were being performed superficially, thus reducing the effectiveness of the program. Evidence of this fact is illustrated in the survey results which show that 78 percent of the systems had not been subject to a sanitary survey within the previous 12 months and that the average period since the last sanitary survey was over 7 years. In addition, very few detailed survey reports have been prepared in recent years. Many of those which have been completed were sent to the purveyor a number of months after the survey. Even more important, follow-up contact with the operator of the supply to determine compliance with recommendations of surveys has also been inadequate.

Although operating records are required by State standards, few have been submitted and little effort has been made to encourage more complete reporting. Submitted reports receive only cursory review by the engineers. Little effort has been made to ensure that all water suppliers submit the required number of bacteriological samples each month. Of the 28 suppliers surveyed 68 percent failed to collect the required number of bacteriological samples during 2 or more months of the previous 12 month reporting period. Review of bacteriological records revealed that little resampling or investigation was done following samples showing contamination.

Seventy one (71) percent of the water suppliers surveyed had not received a chemical analysis within the previous 3 years, the average period being 9 years. In addition, those analyses which were completed did not include important health parameters such as arsenic, cadmium, chromium, cyanide, lead, and silver.

No routine surveillance program has been carried out for communities which adjust the fluoride level in their water supply. Inspection visits of fluoridated water systems by water supply program engineers averaged one visit every five years. Only 13 percent of the water suppliers adjusting fluoride levels were submitting the required monthly check samples to the State laboratory.

Few formal inspections and follow-up surveys of water system facilities and limited review of water quality and operating records result in little enforcement of established standards. Enforcement is hampered not only by lack of manpower to carry out field surveys and laboratory analyses, but also by the continued use of a time consuming, manually operated data recording and retrieval system.

One responsibility which has been carried out with some degree of regularity by the water supply program is the review of plans and specifications for new construction and modifications to existing water system facilities. This effort, along with providing technical assistance on special problems and emergencies, accounts for the majority of the professional manpower resource allocation to water supply activities.

The Environmental Protection Division conducts an annual three day water supply-wastewater operators short school. Although the results of the effort have been beneficial, many of the water supply operators who need training the most are not attending. This is particularly true for the operators of small water systems. These individuals are usually part-time operators with other job responsibilities and are either unable or unwilling to travel long distances or be away from their job responsibilities. They do not attend training programs of the type necessary for adequate knowledge of public health considerations or as prerequisites for certification under the State's voluntary certification program. This lack of training contributed significantly to many of the operational deficiencies noted during the survey.

Laboratory support for the water supply program is provided by the Department's Laboratory Section. Facilities and procedures were evaluated at the chemical laboratory and at three of the six bacteriological laboratories. Both bacteriological and chemical laboratory procedures and operations were found in general compliance with provisions of Standard Methods for the Examination of Water and Wastewater (2). Additional emphasis will be required to provide the laboratory capability to routinely analyze for toxic chemicals in drinking water.

Related Findings

Bottled water sales have not been considered a significant aspect of the Idaho drinking water surveillance program. Current evaluation procedures are to judge bottling practices against State regulations for food preparation establishments and bottled water quality against drinking water quality criteria. Little surveillance of either bottling operations or bottled water quality has been provided, however.

The State Board of Health did not include responsibility for enforcement of the State public water supply regulations in its June 1971 delegation of authority to the local Health Districts. The State and Districts have had informal working agreements, however. Certain Districts have been involved in the removal of sanitary restrictions related to platting of new subdivisions, approval of plans for small public water systems, follow-up on unsatisfactory bacteriological samples, and consultation on problems relating to private water supplies. The ultimate potential for fully utilizing the Health Districts in selected areas of surveillance and enforcement of water supply regulations has yet to be developed.

Waterborne disease outbreaks have occurred in Idaho. Subsequent surveys have shown that in essentially all cases deficiencies existed in the water supply systems during the period when disease was transmitted. Investigations also show that these deficiencies were either unrecognized because of inadequate surveillance for public health hazards, or were recognized but not remedied due to ineffective persuasion or enforcement by health officials. Deficiencies similar to those responsible for waterborne outbreaks are present in water supplies in Idaho and were found during this study. The requisites for repetition of the waterborne outbreaks of the past, namely the presence of diseased individuals in the State and the inadequate surveillance of public water supplies and inadequate enforcement of public health standards, exist in Idaho. Greater vigilance by Idaho's health officials and implementation of the recommendations of this report are needed to assure the State's residents and visitors an adequate and safe supply of drinking water.

RECOMMENDATIONS

The public water supply program of the Idaho Department of Environmental and Community Services is not providing the surveillance and consultative services necessary to fulfill its responsibilities to protect the health of the citizens of Idaho. To properly provide such services, it is recommended that:

1. The water supply program be upgraded to a stature commensurate with its importance to the health of Idaho residents and visitors with a minimum annual budget of $239,000 allocated as follows:

a.	Engineering surveillance and activities	$128,000
b.	Laboratory services	71,000
c.	Management and overhead	40,000
		$239,000

2. The water supply program manpower resources be increased to a minimum of 6 man-years of professional staff and 2 man-years of secretarial support to provide essential surveillance, training and program direction activities.

3. The bacteriological surveillance program be redirected to:

   a. Encourage water supply purveyors to develop their own bacteriological monitoring program,

   b. Charge a reasonable fee to cover the cost of

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routine bacteriological analyses, and

c. Conduct a check sampling program, at State expense, to assure validity of routine sampling by purveyors.

4. The chemical surveillance program be expanded and modified to:

a. Conduct as least one complete chemical analysis on each surface water supply annually and on each ground water supply triennally, and

b. Discontinue the practice of performing chemical analyses for operational control which are considered the responsibility of the water supply purveyor.

5. Enabling legislation be adopted requiring:

a. Mandatory certification of all public water supply facility operators,

b. Coordinated planning and development of new public water supply systems and the consolidation of the large number of small suppliers in certain regions of the State, and

c. Fluoridation of community water supplies not containing dentally significant concentrations of natural fluorides. Enactment of this requirement should be delayed until qualified operators are available and the Department's surveillance and monitoring program improves.

6. The 1964 Idaho Drinking Water Standards (3) be revised to:

a. Recognize recent organizational changes,

b. Update water quality and monitoring criteria,

c. Incorporate special design, operation and monitoring requirements for small public water supplies and bottled water facilities,

d. Establish chlorination as the minimum treatment for all public water supplies and filtration for all surface water sources with individual cases being exempted at the discretion of the Administrator if the purveyor can demonstrate adherence to the standards with disinfection alone, and

e. Reflect improved water treatment and distribution practices.

7. A program be established to document present and future policy decisions for distribution in a water supply program policy manual.

8. Surveillance of all public water supplies be increased to provide at least the minimum levels set forth in the Drinking Water Standards and the Manual for Evaluation of Public Water Supplies (4), including but not necessarily limited to:

a. Development and continued updating of a comprehensive inventory of public water supplies,

b. Thorough annual sanitary surveys of each system with follow-up as required,

c. Increased effort to assure minimum bacteriological sampling along with the required check samples from all supplies,

d. Establishment of a routine complete chemical sampling program for each supply,

e. Establishment of a program to encourage adoption of local cross-connection control ordinances and institution of viable surveillance programs for elimination of backflow conditions,

f. Increased emphasis on surveillance of fluoridated supplies to assure adequacy of these operations, and

g. Initiation of a surveillance program to assure that bottled water quality and bottling practices comply with established standards for food packaging and water quality.

9. Operator training be improved by:

a. The Department working more closely with the State universities and community colleges on operator entry level and upgrade training programs, and,

b. Increased program flexibility to meet the needs and schedules of both full and part-time operators.

10. Computer services be utilized for storage and retrieval of water quality data, engineering report information, monthly operating report records and inventory data.

11. A memorandum of agreement be developed with each Health District for surveillance of and technical assistance to the State's small public and recreational water supply systems.

INTRODUCTION

The great strides made in water treatment in past years have reduced the threat of the once feared major water-borne epidemics. With this technological advancement has come a sense of assurance that our drinking water supplies are failsafe and free from potential health hazards. This false sense of security is reflected not only by the average citizen but has spread to portions of the water supply industry itself. Many supplies have become victims of their own success. They have maintained a status quo without concern for improving the reliability of their system or for meeting the challenge of newer and more stringent quality standards.

The Community Water Supply Study (5) indicated that complacency is not restricted solely to the citizenry and utilities, but has spread also to the regulatory agencies. In general, state agencies are much less active in drinking water supply surveillance today than in past years. Program emphasis and resources have been reallocated to meet the demands of new pollution control mandates. Although extensive water pollution control efforts can provide improved raw water quality, these programs alone do not assure safety or reliability of drinking water. Such assurance is attainable only through renewed awareness of the public health significance of drinking water and the establishment of active

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water supply programs at the state and local levels.

Recognizing this, James L. Agee, Region X Administrator, Environmental Protection Agency, when requested by the Honorable Cecil D. Andrus, Governor of the State of Idaho, to assist in supporting environmental programs in Idaho, recommended as part of a total environmental program assessment package an evaluation of the State's water supply activities. Subsequent correspondence and discussion with State water supply program personnel established that the purposes of the evaluation would be:

1. To ascertain the condition of Idaho's water supplies through field surveys of water supply systems, laboratory analyses of drinking water samples for bacteriological, chemical, and radiochemical constituents, and examination of pertinent data recorded in the State files,

2. To determine the adequacy of legal statutes, regulations and policies, budget and manpower resources, laboratory support, surveillance activities, and operator training,

3. To evaluate the effectiveness of the Idaho water supply program as determined by the condition of a representative number of the State's water supplies, and

4. To recommend improvements and additions which may be needed to assure an adequate supply of safe drinking water for residents of Idaho.

PLAN OF STUDY

WATER SUPPLIES IN IDAHO

Resident population in Idaho, according to the 1970 census, is 713,008. Approximately 482,000 of these people, or 68 percent of the population, are served by 274 public water supplies. Table 1 presents a summary of information concerning these supplies. Many of the State's remaining 231,000 people live in rural areas and obtain their drinking water from individual water systems. In addition to the public supplies, there is an unknown number of systems, generally designated semi-public supplies, which serve State residents and the traveling public at restaurants, service stations, recreation facilities, trailer courts and similar establishments. Presently these supplies are neither listed nor under surveillance by the State.

Figure 2 illustrates the percentage of supplies serving various population ranges. Over 75 percent of the public water supplies in Idaho serve a population of less than 1000. This is significant as the Community Water Supply Study (5) showed that these smaller systems have the most difficulty in continuously providing safe drinking water to their customers.

WATER SUPPLIES STUDIED

Discussions were held in August 1971 with Mr. Vaughn Anderson,

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TABLE I

SUMMARY - PUBLIC WATER SUPPLIES IN IDAHO

Source of Supply	Number	Percent of Total	Population Served	Percent Pop. Served by PWS 1/	Number Filtered	Percent Filtered	Number Disinfected	Percent Disinfected
Surface	38	3.9	51,000	10.6	17	44.7	30	78.9
Ground	228	83.2	395,000	81.9	2	0.9	47	20.7
Dual 2/	8	2.9	36,000	7.5	2	25.0	8	100.0
Total	274	100.0	482,000	100.0	21	7.7	85	31.0

1/ PWS - Public Water Supplies

2/ Both surface and ground sources

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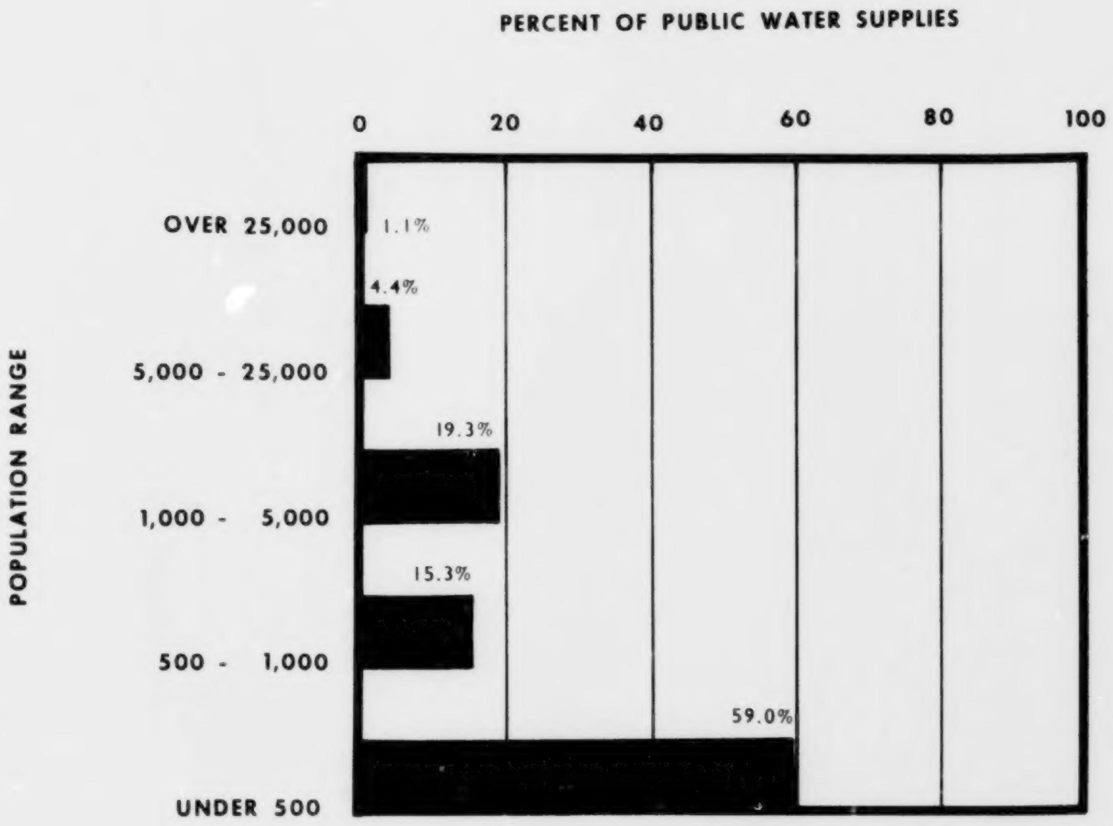


BASED ON 274 PUBLIC WATER SUPPLIES

FIGURE 2 POPULATION RANGES SERVED BY PUBLIC WATER SUPPLIES

Director of Categorical Programs, formerly the Environmental Improvement Division, to review the scope and procedures to be used in conducting the study. Agreement was reached to follow in general the procedures used in the national Community Water Supply Study. The principal objective was to evaluate the total Idaho water supply program and recommend improvements in the program that would assure an adequate supply of safe drinking water for the residents of Idaho. It was agreed also that investigation of a representative number of water supplies would be sufficient to evaluate the effectiveness of the State program. No individual, or semi-public water supplies were to be selected for study.

Two factors were considered in selecting the water supplies to be studied. First was a need to select supplies representative of the sizes of systems, types of sources, methods of treatment and geographical distribution throughout the state. Second was a need to select a sufficient number of supplies to enable comparison of the findings of the Idaho study to those of the national Community Water Supply Study. To accomplish these objectives it was determined that at least 10 percent of Idaho's 274 public water supplies would be surveyed. These 28 supplies would be selected at random from the respective percentage of supplies within predetermined population groupings. Table 2 illustrates the population groupings and the determination of the number of systems to be selected within each group.

TABLE 2

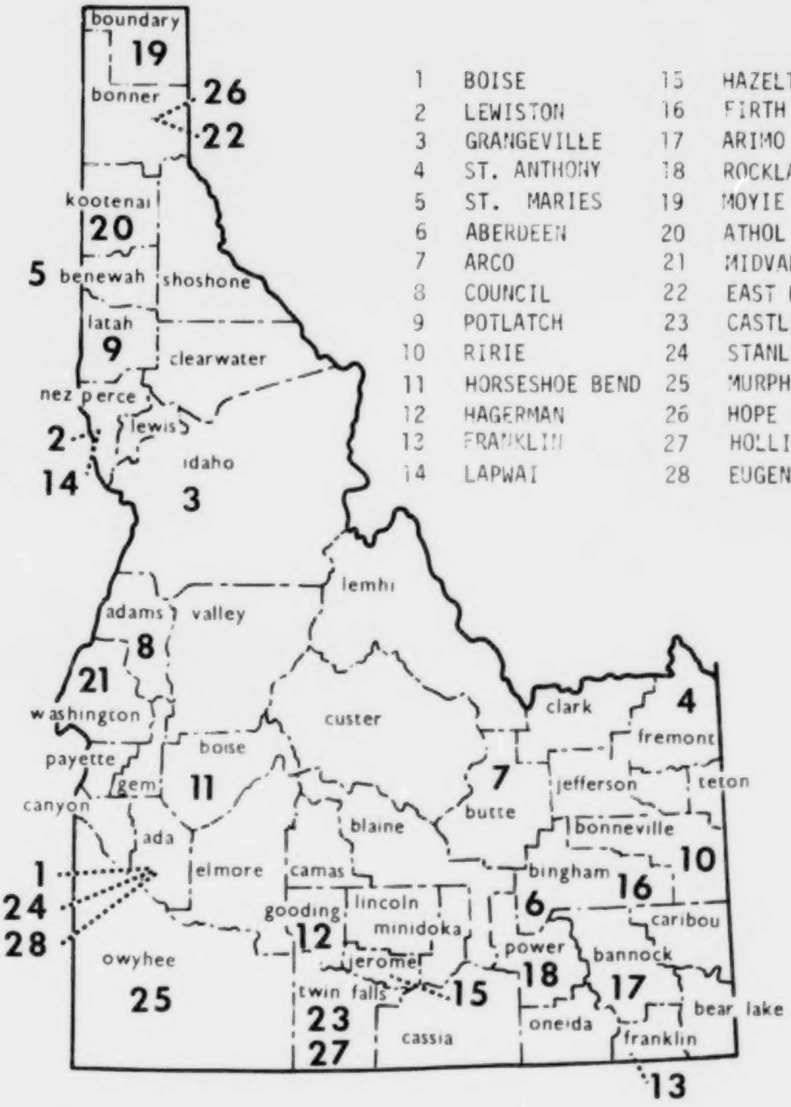
SELECTION OF PUBLIC WATER SUPPLIES

POPULATION GROUP	POPULATION SERVED	NUMBER OF SYSTEMS	% SYSTEMS	(% SYSTEMS)(28)	NUMBER SELECTED
Over 25,000	152,500	3	1.1	0.3	1
5,000 - 25,000	150,081	12	4.4	1.2	1
1,000 - 5,000	120,597	53	19.3	5.4	5
500 - 1,000	28,170	42	15.3	4.3	4
Under 500	30,551	164	59.9	16.8	17
TOTAL	481,899	274	100.0	28.0	28

The 28 supplies selected are listed in Appendix A, Table 1 along with their respective populations served, sources of supply and treatment provided. Following the random selection, a check was made to determine the representation from the standpoint of geography, type of source, and type of treatment. All three factors were found acceptable. Location of the supplies is shown in Figure 3.

These 28 supplies serve over 106,000 people or about 15 percent of the total state population and approximately 22 percent of those served by public water supplies in Idaho.

According to State dental health records, fourteen (14) of the 274 public water supply systems in Idaho adjust the fluoride content of their water for dental health protection. In view of the small number of systems reportedly fluoriuating, a special fluoride study was conducted of all fourteen supplies. Figure 4 shows the location of the fluoridated systems surveyed.


boundary
19
bonner
26
22
kootenai
20
5
benewah
shoshone
latah
9
clearwater
nez perce
2
lewis
14
idaho
3
lemhi
adams
valley
8
21
washington
payette
gem
11
boise
custer
clark
4
fremont
7
jefferson
teton
butte
canyon
ada
blaine
bonneville
10
1
24
28
elmore
camas
bingham
16
6
caribou
gooding
lincoln
minidoka
12
power
bannock
jerome
18
17
owyhee
25
twin falls
15
bear lake
23
27
cassia
oneida
franklin
13

1	BOISE	15	HAZELTON
2	LEWISTON	16	FIRTH
3	GRANGEVILLE	17	ARIMO
4	ST. ANTHONY	18	ROCKLAND
5	ST. MARIES	19	MOYIE SPRINGS
6	ABERDEEN	20	ATHOL
7	ARCO	21	MIDVALE
8	COUNCIL	22	EAST HOPE
9	POTLATCH	23	CASTLEFORD
10	RIRIE	24	STANLEY POND W.A.
11	HORSESHOE BEND	25	MURPHY
12	HAGERMAN	26	HOPE
13	FRANKLIN	27	HOLLISTER
14	LAPWAI	28	EUGENE OUTLOOK W.A.

FIGURE 3

PUBLIC WATER SUPPLY SYSTEMS SURVEYED

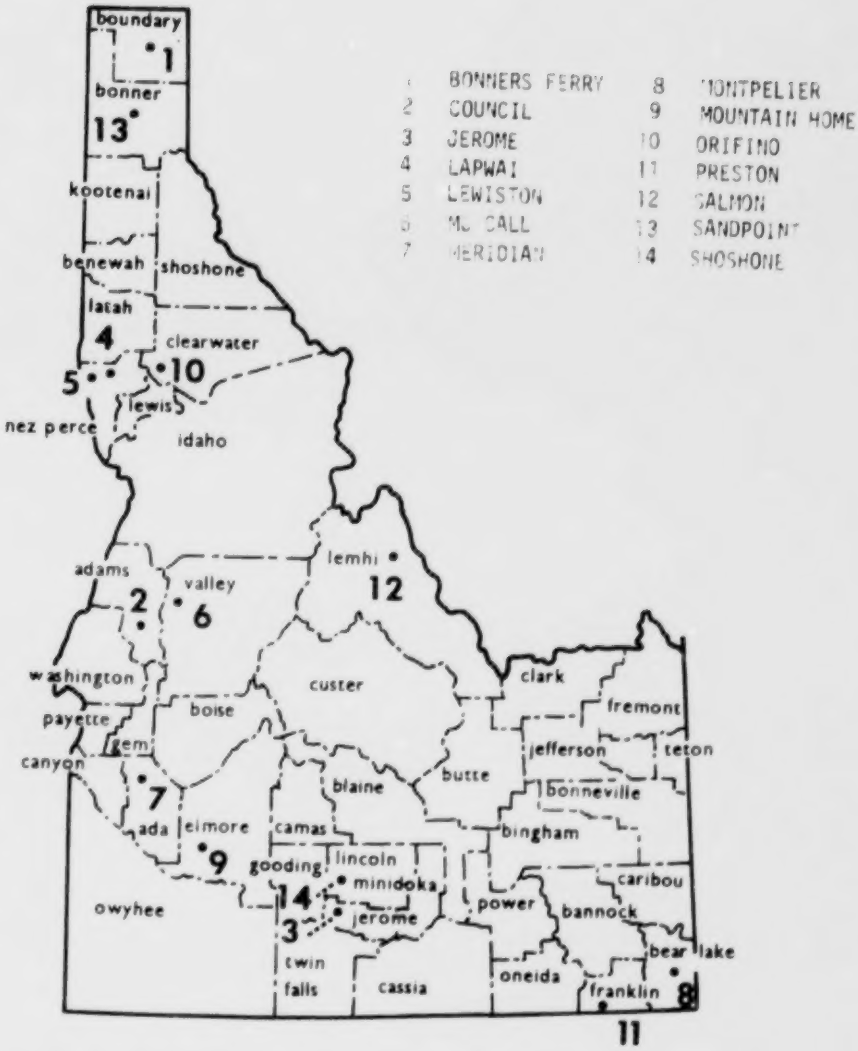

1 BONNERS FERRY
2 COUNCIL
3 JEROME
4 LAPWAI
5 LEWISTON
6 Mc CALL
7 MERIDIAN
8 MONTPELIER
9 MOUNTAIN HOME
10 ORIFINO
11 PRESTON
12 SALMON
13 SANDPOINT
14 SHOSHONE
boundary
1
bonner
13
kootenai
benewah
shoshone
latah
4
clearwater
5
10
lewis
nez perce
idaho
adams
valley
2
6
lemhi
12
washington
custer
clark
fremont
payette
boise
jefferson
teton
gem
canyon
7
butte
blaine
bonneville
ada
elmore
camas
bingham
9
gooding
lincoln
minidoka
caribou
owyhee
14
power
bannock
3
jerome
bear lake
twin falls
cassia
oneida
franklin
8
11

FIGURE 4

FLUORIDATED WATER SUPPLY SYSTEMS IN IDAHO

EVALUATION CRITERIA

The effectiveness of the Idaho water supply program in protecting public health was judged on the basis of drinking water quality, reliability of system physical facilities and adequacy of sanitary surveillance. Criteria used in each aspect of the evaluation follows.

WATER QUALITY

Adequacy of drinking water quality was based on the following bacteriological and chemical criteria

1. Bacteriological quality - Comparisons were made of the bacteriological sampling record of each supply for 12 months prior to the survey against the bacteriological sampling frequency and quality criteria of the 1962 United States Public Health Service Drinking Water Standards (1), hereafter referred to as the Drinking Water Standards. A supply was considered unsatisfactory if the bacteriological quality failed to meet the Drinking Water Standards two or more of the prior 12 months, or if insufficient samples were collected during two or more of the prior 12 months in order to determine bacteriological quality. Since many of the smaller supplies routinely do not meet the sampling frequency, bacteriological samples were collected from the distribution system of each supply at a rate of 10 percent of the

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number required per month by the Drinking Water Standards. These samples were analyzed by EPA and health district laboratories and the results used to provide additional background on water quality. Any sample having a total coliform density greater than 4 per 100 ml was considered to have failed the bacteriological standard. In addition, a supply was considered unsatisfactory if the arithmetic mean coliform density of the samples collected during the survey exceeded one per 100 ml.

2. Chemical quality - Samples for chemical analyses were collected from each supply in accordance with the schedule shown in Table 3. These samples were analyzed by Environmental Protection Agency Laboratories for the parameters listed in Table 4. Each sample was compared to the chemical quality criteria of the Drinking Water Standards and rated as either:

1. Meeting the Standards for all parameters,
2. Failing to meet one or more of the "recommended" limits, but meeting all of the mandatory limits, or
3. Failing to meet one or more "mandatory" limits.

FACILITIES

Adequacy of water supply system facilities was judged on the basis of the Manual for Evaluating Public Drinking Water Supplies (4) and the Drinking Water Standards. System elements considered

TABLE 3 - WATER SUPPLY FIELD SURVEY SAMPLING SCHEDULE

Population Group	System	Source	Treatment	Source Raw	Source Finished				Distribution System	
				Bact.	Wet	Trace	Rad.	Other	Bact.	Trace
Over 25,000	Boise	36 Wells	Chlo	36	5	36	5	-	10	10
5,000-25,000	Lewiston	River & 3 Wells	Filt/Chlo/Fluo	4	2	4	2	Special	4	4
1,000-5,000	St. Anthony	4 Wells	Chlo	4	1	4	1	-	2	2
	St. Maries	Rochat Creek	Chlo	1	1	1	1	Special	2	2
	Grangeville	2 Wells	Chlo	2	1	2	1	-	2	2
	Aberdeen	3 Wells	None	3	1	3	1	-	2	2
	Arco	4 Wells	Chlo	4	1	4	4	-	2	2
500-1,000	Horseshoe Bend	4 Wells	None	4	1	4	1	-	2	2
	Council	3 Springs/2 Wells	Chlo/Fluo	5	2	5	2	-	2	2
	Ririe	2 Wells	None	2	1	2	1	-	2	2
	Potlatch	5 Wells	None	5	1	5	1	-	2	2
Under 500	Hagerman	Spring	Chlo	1	1	1	1	-	2	2
	Arimo	Springs & Well	Chlo	3	1	3	1	-	2	2
	Firth	2 Wells	None	2	1	2	1	-	2	2
	Castleford	Well	Chlo	1	1	1	1	-	2	2
	Eugene Outlook	Well	None	1	1	1	1	-	2	2
	Moyie Springs	Skin Creek	Filt/Chlo	1	1	1	1	Special	2	2
	Athol	Well	None	1	1	1	1	-	2	2
	Hope	Spring	None	1	1	1	1	-	2	2
	Hollister	2 Wells	None	2	1	2	1	-	2	2
	Murphy	2 Wells	None	2	1	2	1	-	2	2
	Lapwai	2 Wells	Fluo	2	1	2	1	-	2	2
	Rockland	Well	Chlo	1	1	1	1	-	2	2
	Stanley-Pond	Well	None	1	1	1	1	-	2	2
	Hazelton	2 Wells	Chlo	2	1	2	1	-	2	2
	East Hope	Creek	Filt/Chlo	1	1	1	1	Special	2	2
	Franklin	6 Springs	None	6	1	6	1	-	2	2
	Midvale	2 Wells	None	2	1	2	1	-	2	2

TABLE 4

CHEMICAL ANALYSES CONDUCTED ON SURVEY SAMPLES

Routine For All Supplies

- Arsenic (As)
- Barium (Ba)
- Cadmium (Cd)
- Chloride (Cl)
- Chromium (Hexavalent - Cr^{+6})
- Cobalt (Co)
- Color
- Copper (Cu)
- Fluoride (F)
- Iron (Fe)
- Lead (Pb)

- Manganese (Mn)
- Mercury (Hg)
- Methylene-Blue Active Substances (MBAS)
- Nickel (Ni)
- Nitrate (NO_3)
- pH
- Radiochemical
  - Gross alpha
  - Gross beta
- Selenium (Se)
- Silver (Ag)
- Specific Conductance
- Sulfate (SO_4)
- Total Dissolved Solids (TDS)
- Turbidity
- Zinc (Zn)

Special For Selected Supplies

- Cyanide (Cn)
- Carbon Chloroform Extract (CCE)
- Carbon Alcohol Extract (CAE)

- Insecticides
  - Aldrin
  - Lindane
  - Chlordane
  - DDD, DDE, DDT
  - Dieldrin, Endrin
  - Heptachlor, Heptachlor-epoxide
  - Methoxychlor, Toxaphene

- Herbicides
  - 2, 4-D
  - 2, 4, 5-T
  - Silvex

were:

1. Source - Each source was judged by compliance of its chemical quality with the Drinking Water Standards, protection against contamination, and adequacy of quantity as determined by past experience and current water demands.

2. Treatment - Facilities were judged on the basis of the degree of treatment provided, maintenance and operation of equipment, and overall reliability of operation including standby equipment.

3. Distribution - Finished water storage facilities and system pressure were included in evaluating the distribution system. Storage was considered adequate from the standpoint of quality protection if reservoirs were covered and well maintained. Storage volume was judged adequate if sufficient quantities of water were available during periods required for repair of treatment and/or pumping equipment. Pressure in various parts of the system was used as a measure of the adequacy of pipe sizing and looping. A pressure of at least 20 psi in all parts of the system was considered adequate.

4. Quality control - A supply was judged adequate if proper records of system operation were being maintained; appropriate bacteriological and chemical testing was being performed; and a cross-connection surveillance, elimination, and device testing program was being implemented.

Each supply was rated on the above four system elements as shown in Appendix A, Table III. A public health risk factor, ranging from 0 to 10, was then assigned for each supply. A risk factor of zero indicates least or little risk, while a rating of 10 indicates most or high risk.

WATER SUPPLY PROGRAM

Adequacy of the State surveillance program was evaluated on the following

1. Legislative authority - Reviews were made of the State statutes pertaining to protection of the State's water resource for drinking purposes and to provisions for safe water supplies.

2. Regulations and policy - Rules and regulations promulgated by the Department of Environmental and Community Services and the program policies adopted by the Environmental Protection Division were reviewed to determine their adequacy with respect to current water supply practice.

3. Surveillance of water supplies - Reviews were made of bacteriological monitoring, chemical monitoring and field surveillance. These program elements were considered adequate if:

a. The number of bacteriological samples examined for each supply met the minimum number specified in the Drinking Water Standards 11 of the 12 months immediately prior to the survey,

b. Chemical analyses, including all parameters listed in the _Drinking Water Standards_, had been performed within the previous three years,

c. The results of bacteriological and chemical samples not meeting the _Drinking Water Standards_ were reviewed and the necessary follow-up performed routinely,

d. A field survey of the supply had been conducted within 12 months prior to the survey, and

e. Follow-up surveys to previously identified system facility and operational deficiencies were performed routinely.

4. Laboratory support - Surveys were made of the State bacteriological and chemical laboratories in Boise as well as the Department's bacteriological laboratories in Lewiston and Idaho Falls. Each laboratory was evaluated to determine its capability to provide adequate support for the program and the compliance of its procedures with _Standard Methods for the Examination of Water and Wastewater_ (2).

5. Budget and staffing - Present staffing and program funding levels were evaluated and compared with the adequacy of program elements described above.

6. Other program activities such as operator training and certification, cross-connection control, fluoridation, and technical assistance were also evaluated.

STUDY FINDINGS

WATER SUPPLY STATUS

Bacteriological Quality

Review of the bacteriological sampling records indicated that 21(75%) of the 28 supplies evaluated either failed to meet the bacteriological quality limits of the Drinking Water Standards (1) two or more of the 12 months prior to the survey or failed to collect sufficient samples during the period to adequately determine bacteriological quality. These systems serve over 13,750 people or approximately 13% of the population served by public water supplies surveyed.

Further breakdown of data, as shown in Appendix A, Table II, indicated that nine (35%) of the 26 supplies submitting bacteriological samples failed to meet the bacteriological quality standards at least one month during the period. Two supplies had submitted no samples. Of these two, one failed to meet the bacteriological standards for the samples collected during the survey.

The ten supplies failing to meet the bacteriological standards either during the 12 month period prior to the survey or as a result of samples collected during the field investigations were evaluated in an attempt to relate bacteriological quality to disinfection practices. As shown in Table 5, there is no

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TABLE 5

BACTERIOLOGICAL QUALITY OF DISTRIBUTED WATER RELATED TO CHLORINATION PRACTICE

Type of Source	Chlorination Practiced	Number of Systems	Percent Systems Exceeding Coliform Limit 1/	Number of Systems with Inadequate Chlorination
Surface Water Source	No	0		
	Yes	2	0	0
Mixed Ground and Surface Water Source	No	0		
	Yes	1	0	0
Spring Source	No	2	100	
	Yes 2/	2	100	2
Well Source	No	15	33	
	Yes	3	33	1
Mixed Spring and Well Source	No	1	0	
	Yes	2	50	1
All Types	No	18	39	
	Yes	10	40	4

1/ Bacteriological data from State record for 12 months prior to survey. Where no samples submitted during this period, survey data was used.

2/ Some springs chlorinated.

apparent correlation between bacteriological quality and either type of source or disinfection. Of importance, however, is the relationship between the adequacy of chlorination, as determined by field survey observation, and bacteriological quality. In addition to the statistical significance noted, examination of individual system data confirms that the supplies with inadequate chlorination exceeded the bacteriological standards.

Comparisons of bacteriological quality with system size were also made. Table 6 shows the relationship of bacteriological quality to population served. These results indicate that smaller water systems in Idaho distribute poorer quality water.

Chemical Quality

As shown in Table 7, the average period since the last state chemical analysis for the 28 supplies surveyed was 9 years. The chemical constituents routinely reported from these analyses were those for which recommended standards have been established. Constituents such as arsenic, barium, cadmium, chromium, copper, cyanide, lead, mercury, MBAS, organics (CCE, CAE), phenols, silver and selenium were not routinely monitored. Adequacy of chemical quality for the 28 supplies surveyed was determined, therefore, from samples collected during the field surveys. Details of particular constituents exceeded in these samples are found in Appendix A, Table II.

TABLE 6

COMPARISON OF WATER QUALITY BY POPULATION GROUP

POPULATION GROUP	NUMBER OF SYSTEMS SURVEYED	BACTERIOLOGICAL STANDARDS NOT MET				CHEMICAL STANDARDS NOT MET			
		Samples Collected During Survey		Samples Submitted Prior 12 Months		RECOMMENDED NOT MET		MANDATORY NOT MET	
		Number of Systems	Percent of Systems	Number of Systems	Percent of Systems	Number of Systems	Percent of Systems	Number of Systems	Percent of Systems
Over 25,000	1	0	0%	0	0%	1	100%	0	0%
5,000-25,000	1	0	0%	0	0%	0	0%	0	0%
1,000-5,000	5	0	0%	0	0%	2	40%	0	0%
500-1,000	4	1	25%	3	75%	0	0%	0	0%
Under 500	17	4	24%	6	35%	3	18%	1	6%
Combined Survey	28	5	18%	9	32%	6	21%	2	7%

TABLE 7

COMPARISON OF SYSTEM SURVEILLANCE BY POPULATION SERVED

RANGE OF POPULATION	NUMBER OF SYSTEMS SURVEYED	AVERAGE NUMBER OF YEARS SINCE LAST STATE		SYSTEMS NOT MEETING SURVEILLANCE REQUIREMENTS			OPERATOR TRAINING
		Chemical Analysis	Sanitary Survey	Chem.1/ Anal.	San.2/ Survey	Bact.3/ Anal.	Short School
Over 25,000	1	1	1	0%	0%	0%	100%
5,000-25,000	1	2	1	0%	0%	0%	100%
1,000-5,000	5	5	5	80%	80%	40%	60%
500-1,000	4	8	6	75%	100%	100%	25%
Under 500	17	11	9	76%	82%	47%	12%
Combined Survey	28	9	7	71%	78%	54%	36%

Total Population Served by Systems Surveyed: 106,035

Total State Population - 1970 Census: 713,008

Percent Population Surveyed: 15%

1/ Sampling Frequency: Within 3 years

2/ Survey Frequency: Annual

3/ Bacteriological Sampling As Required to Meet USPHS Drinking Water Standards

Results of the analyses indicated only one supply (4%) not meeting the mandatory chemical standards. Drinking water failing to meet the mandatory chemical standards poses a threat of toxic material hazardous to human health. Supplies or individual sources from which samples have been confirmed as failing to meet these standards should be rejected.

Seven (25%) of the systems surveyed failed to meet one or more of the recommended chemical limits. Concentrations of chemical constituents exceeding these limits may impart objectionable taste, odor and/or undesirable physiological effects. Since these render drinking water less than desirable or aesthetically inferior, supplies or individual sources failing to meet these standards should be evaluated for treatment or used as standby for alternate higher quality sources.

These results illustrate the importance of routinely providing complete chemical analyses to detect potential health problems.

Facilities

Information obtained during sanitary surveys was used to rate systems Adequate (A) or Inadequate (I) in each of four system elements: source, treatment, distribution and quality control. A risk factor was then assigned on the basis of the relationship of noted facility deficiencies to potential water quality deterioration and public health risk. Ratings for individual system elements and the assigned risk factors are presented in Appendix A, Table III.

The risk factor is an overall judgment of the system by the surveying engineer rather than a summation of deficiencies in individual system elements. The factors, ranging from 1 to 8 with an average of 3.9, indicate that significant facility problems exist. As shown in Appendix A, Table III, 14 (50%) of the supplies were considered to have inadequate protection of the source against contamination. Even more significant is the fact that 9 (64%) of these 14 supplies were also found to have either inadequate treatment or none at all.

Thirty nine (39) percent of the system were judged to have inadequate distribution system facilities and 96 percent were providing inadequate quality control to assure protection of the water supplied. A number of the larger supplies were providing appropriate bacteriological sampling, chemical testing and operating records. Only one supply, however, was judged to be carrying out an adequate cross-connection control program. Most of the smaller supplies were deficient in one or all of these areas.

Operator Competence

Proper system operation and maintenance is essential in providing an adequate supply of safe drinking water. A good operator knows more than how to start a pump or open a valve. He also should be knowledgeable about the importance and practice of treatment required for his supply, as well as elementary water chemistry and microbiology.

Evaluation of the operators and their qualifications for the 28 water supplies surveyed revealed that only 3 (11%) employed full-time water system operators. Five supplies (18%) utilized full-time employees but divided their responsibilities between many areas of the public works department.

Most of the operators interviewed were conscientious and concerned about doing a good job. None, however, had received any college level training in water supply operations and only 8 (29%) had participated in any operator short school training. Many of the operators, although aware of their lack of knowledge in critical public health aspects of water supply operations, felt they could not afford the time away from the job for even short course training. Several stated that the city would not reimburse them for expenses incurred for such training or permit them to leave the local area.

Fluoridation

Fluoridation is a proven public health practice which provides an optimum level of fluoride ion for the prevention of tooth decay. Proper operation and maintenance of fluoridation equipment, as well as concern on the part of the operator, are essential if maximum health benefits are to be realized.

At the time of the survey 14 suppliers were reported by the Department of Environmental and Community Services to be fluoridating. Field surveys of all 14 revealed, however, only 8 installations in operation. Six had discontinued feeding fluoride for various reasons, including equipment breakdown and disfavor of fluoridation by the operator.

The actual level of fluoride in the distribution system is the single most important factor in evaluating the adequacy of a water fluoridation program and the benefits which will be received. Of the eight installations in operation only two (25% were found to be providing a fluoride ion content in the distribution system within the 0.8-1.3 mg/l range recommended by the State. Five (63%) were underfeeding, thereby significantly reducing the health benefits of fluoridation, and two (25%) were overfeeding. Samples collected from one system were both above and below the recommended fluoride ion range.

Operators at two of the eight installations were not conducting fluoride ion analyses and in fact had no test equipment or facilities for such analyses. Of the six performing fluoride ion analyses only three were conducting analyses daily and none were analyzing raw water for natural fluoride content on a regular basis. Only one operator was routinely sending the required monthly check sample to the State Laboratory.

Fluoride feed equipment and facilities were found adequate at 4 (50%) of the installations operating. Maintenance was judged satisfactory at only 4 (50%) of the facilities even though plant operators had been advised of the survey. Storage arrangements for chemical compounds were unsatisfactory at 4 of the 8 installations, and 6 of the operators interviewed either did not have available or were not using safety equipment in their operation.

A trained operator with a genuine interest in feeding fluoride is essential to the satisfactory operation of a fluoridation installation. Two of the eight facilities were operated by personnel not completely familiar with the chemical feed equipment at their plants, and three of the six operators performing fluoride analysis were not adequately trained in use of the test equipment. In addition, 3 of the 8 operators interviewed did not favor fluoridation of public water supplies.

WATER SUPPLY PROGRAM

Legal Authority and Responsibilities

Regulatory authority over health aspects of public water supplies in Idaho is provided in Idaho Code, Title 37, Chapter 21, Section 37-2102: Domestic water to be protected. Section 37-2102 provides:

> 1. That any person, corporation, or officers of a municipality owning or operating a system for the purposes of providing water for domestic purposes shall protect the system and keep it free from impurities, whether bacterial or chemical,

2. That the State Board of Health shall annually promulgate standards for protection from impurities and standards for bacterial and chemical purity which must be consistent with the drinking water standards of the U.S. Public Health Service, and

3. The State Board of Health authority to issue reports and post signs indicating compliance with the standards.

Section 37-2103 specifies that any person, corporation or officers of a municipality failing to comply with the provisions of Chapter 21 shall be guilty of a misdemeanor.

Title 39, Chapter 4, Section 39-414 of the Idaho Code provides that the District Boards of Health shall have and may exercise the powers and duties to administer and enforce all State health laws, regulations and standards, and to do all duties expressly delegated to them by the State Board of Health. On June 16, 1971 the State Board of Health delegated to the seven District Boards of Health authority to enforce State public health laws and Board of Health rules and regulations in the areas of food service establishments, meat and meat products, milk, solid waste, septic tanks, swimming pools and vital statistics. Public water supply was not included in the delegation of authority and thus primary responsibility for enforcement of the public water supply regulations remains with the State health agency.

The Environmental Protection and Health Act of 1972, creating the Department of Environmental Protection and Health, transferred the authority of the Board of Health and the functions of the Department of Health to the new agency. Provisions of the act are included in Idaho Code, Title 39, Chapter 1.

Sections 39-101 to 39-114 establish statutory definition of a public water supply; empower the administrator of the department to enforce standards, rules and regulations relating to public water supplies, enable the Board of Environmental Protection and Health to adopt, amend, or repeal rules, regulations, codes and standards, and provide for civil penalties of up to $1,000.00 per day for non-compliance with provisions of the act or any rule or regulation promulgated thereunder.

The 1973 Idaho Legislature enacted three measures impacting the water supply program as follows:

1. Section 39-103, Idaho Code, relating to definition of terms is amended to define a public water system as all facilities actually used or intended for use in serving water for drinking or domestic use to ten or more separate premises or households, or any other supply which serves water to the public and which the Department of Environmental Protection and Health declares to have potential health significance.

2. Section 39-118 is added to Chapter 1, Title 39, Idaho Code providing for the submission of plans and specifica-

tions for the new construction of or modification to all public water supply systems or public water treatment systems and for the approval of the plans and specifications by the Department of Environmental Protection and Health prior to initiating construction. The requirement may be waived by the Department if the facility will produce no impact on the environment or public health.

3. The Department of Environmental Protection and Health is merged with the Department of Social and Rehabilitation Services, and the State Youth Training Center and is designated the Department of Environmental and Community Services. All codes, rules, regulations, standards, plans, licenses, permits, and certificates of the former departments remain in effect and the Board of Environmental Protection and Health is retitled the Board of Environmental and Community Services. The Governor is also authorized to establish substate administrative regions to improve the delivery of environmental, health and social services.

The Idaho Code provides comprehensive administrative machinery for the acquisition of water rights to both surface and ground waters. In addition, Title 42, Chapter 2, Section 42-238 of the Code vests in the Department of Water Administration the power and duties relating to minimum well construction standards for protection of ground water resources and to the licensing of well drillers.

Regulations and Standards

The standards currently in use by the Division of Environmental Protection for public water supplies were adopted in November 1964. These standards reference the appropriate sections of the Idaho Code, provide definitions of key terms, and specify the type of source, treatment, operational and water quality standards upon which the adequacy of the supply is judged.

Water supply is to be obtained from the most desirable source with effort being made to prevent or control source pollution. If adequate source protection is not provided, treatment is required. Frequent surveys are to be made by the purveyor to identify health hazards. Correction of health deficiencies is to be made in accordance with a program approved by the regulatory agency. The agency or individual responsible for the condition of the system is also defined.

Approval of water supplies is dependent in part upon enforcement of rules and regulations, adequate protection of water quality throughout the system, proper system operation under qualified personnel acceptable to the regulatory agency, adequate system capacity, satisfactory record of laboratory examinations showing compliance with water quality standards, and submission and approval of engineering plans and specifications for construction or expansion of the system.

Water quality must meet criteria adopted from the 1962 U. S. Public Health Service Drinking Water Standards. These criteria include standards for sampling, bacteriological quality, physical characteristics, chemical quality, and radioactivity. Recommended analytical methods for determining compliance with the standards are also included.

Construction and design standards are also included. Part I outlines the format and material to be included in submitting plans and specifications. Parts II and III describe requirements for utilization of surface and ground water sources. Parts IV through XII include recommendations and requirements for pretreatment, high rate treatment units, softening, filtration, disinfection, iron and manganese removal, taste and odor control, and fluoridation. Part XIII outlines standards for the location of pump stations, construction of buildings, and the construction and installation of pump units. Part XIV lists requirements for the design, location, material, interior protective coating, and disinfection of storage reservoirs and pressure tanks. Part XV prescribes acceptable distribution system materials, pipe sizes, locations and pressures as well as specifying disinfection requirement for water mains and prohibiting cross-connections.

Organization

Considerable reorganization of health and social service agencies has occurred recently in Idaho. At the time of the field survey in 1971-1972, the Idaho water supply program was organizationally located within the Idaho Department of Health. The water supply activity was not an identifiable unit within the organization and had no specific manpower or budget allocations. General direction for program activities was provided by the Chief of the Engineering Division. Field work was accomplished by individuals in the three Health Department Regional Offices. Total manpower allocation for public water supply activities in FY '71, including clerical support, was estimated by the Department to be 1.0 man-year. Estimated water supply program expenditures, excluding laboratory support, were $22,000. Laboratory support for this same period was calculated at $69,000. The total expenditure of $91,000 for FY '71 amounts to approximately $330 for surveillance of each of the 274 public water supplies in Idaho, or about 13 cents per capita.

Creation of the Department of Environmental Protection and Health by legislative mandate in 1972 resulted in certain organizational changes and the establishment of the Division of Environmental Protection. Water supply activities remained located in two of the three organizational units under the Division. General program direction was provided by the Director of Categorical Programs with field work being carried by the regional office staff under direction of the Director of Regional Operations. Manpower and budget for FY '72 water supply activities remained the same as that in FY '71.

Estimated manpower and budget figures for FY '73 water supply surveillance activities show an increase in manpower expenditures to 2.7 man-years and a budget increase to $44,000. These figures include program direction, plan review and field surveillance. Laboratory support increased to $80,000 for the period. Total estimated expenditures for FY '73 are $124,000, which amounts to approximately $450 per supply or 17 cents per capita. Table 8 illustrates the status of water supply budget allocations for the period FY 1971 to FY 1973.

Creation of the Idaho Department of Environmental and Community Services by the 1973 Idaho Legislature has had little influence on the basic organization structure of the State's environmental programs. An organization chart for the Department's Environmental Protection Division is shown in Figure 5. Significant for improving the posture of water supply activities in the State, however, is the inclusion of a public health engineer position under the Director of Categorical Programs specifically for water supplies and swimming pools. This individual will be primarily responsible for standards revision, policy development, training coordination, and overall water supply program direction. As in the past, field surveillance for all environmental

TABLE 8

WATER SUPPLY ACTIVITY RESOURCE ALLOCATIONS

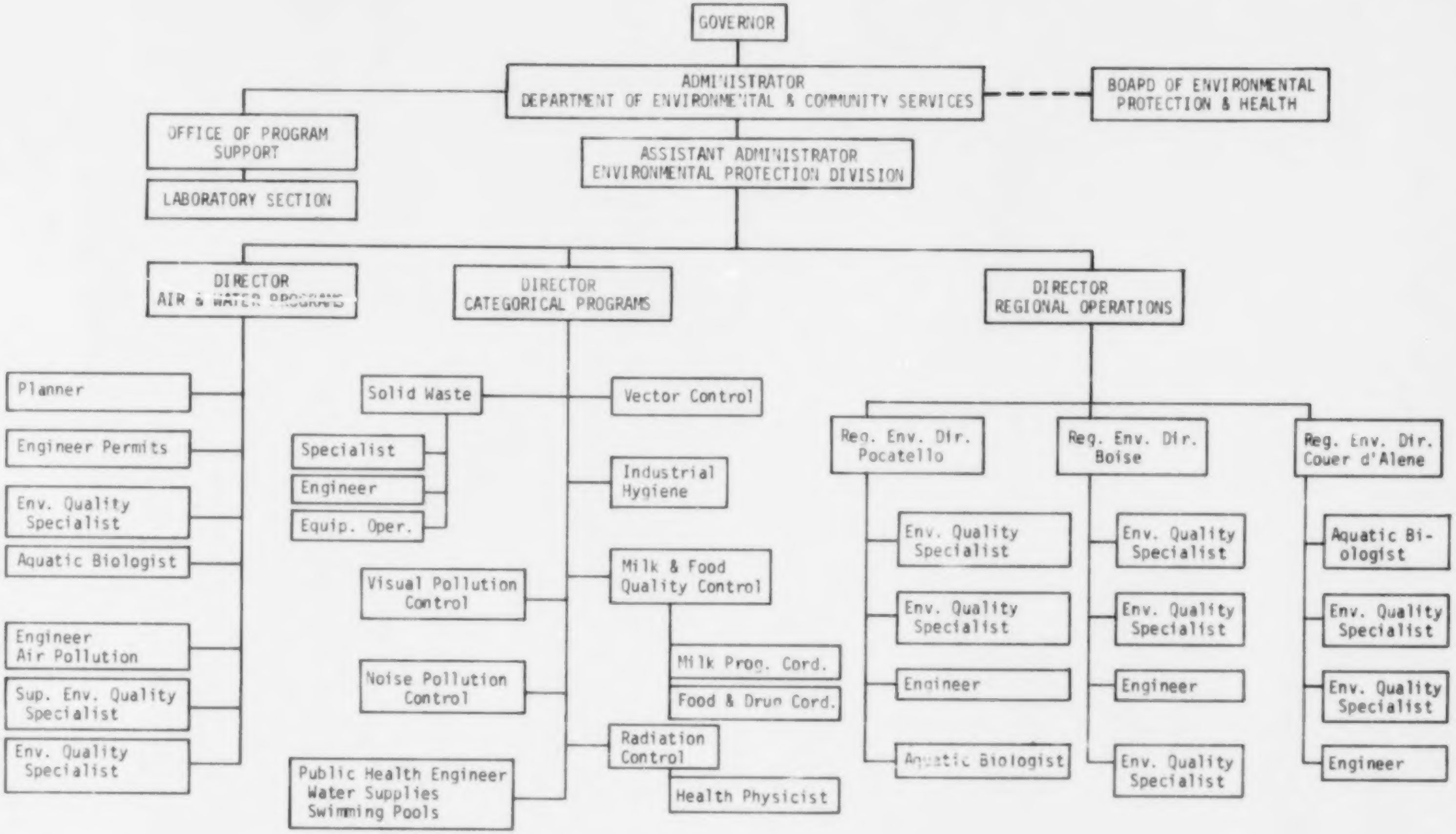
FISCAL YEAR	MANPOWER FOR ENGINEERING (MAN-YEARS)1/	DOLLAR EXPENDITURES				
		ENGINEERING ACTIVITIES	LABORATORY SUPPORT (BACT. + CHEM.)	TOTAL	PER SYSTEM	PER CAPITA2/
1971	1.0	22,000	56,500+12,500	91,000	330	.13
1972	1.0	22,000	55,700+13,300	91,000	330	.13
1973	2.7	44,000	58,000+22,000	124,000	450	.17

1/ Includes clerical support

2/ Calculation based on total State population, 1970 census

FIGURE 5

ORGANIZATIONAL CHART—IDAHO DEPARTMENT OF ENVIRONMENTAL AND COMMUNITY SERVICES


GOVERNOR
ADMINISTRATOR DEPARTMENT OF ENVIRONMENTAL & COMMUNITY SERVICES
BOARD OF ENVIRONMENTAL PROTECTION & HEALTH
OFFICE OF PROGRAM SUPPORT
LABORATORY SECTION
ASSISTANT ADMINISTRATOR ENVIRONMENTAL PROTECTION DIVISION
DIRECTOR AIR & WATER PROGRAMS
DIRECTOR CATEGORICAL PROGRAMS
DIRECTOR REGIONAL OPERATIONS
Planner
Engineer Permits
Env. Quality Specialist
Aquatic Biologist
Engineer Air Pollution
Sup. Env. Quality Specialist
Env. Quality Specialist
Solid Waste
Specialist
Engineer
Equip. Oper.
Visual Pollution Control
Noise Pollution Control
Public Health Engineer Water Supplies Swimming Pools
Vector Control
Industrial Hygiene
Milk & Food Quality Control
Milk Prog. Cord.
Food & Drug Cord.
Radiation Control
Health Physicist
Reg. Env. Dir. Pocatello
Env. Quality Specialist
Env. Quality Specialist
Engineer
Aquatic Biologist
Reg. Env. Dir. Boise
Env. Quality Specialist
Env. Quality Specialist
Engineer
Env. Quality Specialist
Reg. Env. Dir. Couer d'Alene
Aquatic Biologist
Env. Quality Specialist
Env. Quality Specialist
Engineer

program activities will be carried out by the staff of the three Regional Offices.

The Regional Environmental Directors are registered professional engineers and have water supply experience. At least one other member of each Regional Office staff is also an engineer. However, additional time will be required for these individuals to obtain water supply experience.

Laboratory support for water supply activities is provided by the Laboratory Section under the Department's Office of Program support. The Laboratory Section operates a central laboratory in Boise which provides chemical analyses capability for all Department programs. Bacteriological analyses are provided by the central laboratory and five branch laboratories located in Coeur d'Alene, Lewiston, Twin Falls, Pocatello and Idaho Falls. These laboratories provide bacteriological capability for all State and Health District program activities.

Activities

Engineering activities and responsibilities concerning public water supplies, as outlined in the previously stated regulations, are:

1. Development of rules and regulations to assure protection of domestic water supplies,

2. Review of plans and specifications for new construction

and modification to existing systems,

3. Inspection of facilities and operation of all public water supplies,

4. Review and evaluation of operating reports and water quality data from public water supplies, and

5. Enforcement of sanitary standards to protect the quality of water served to the public.

In addition, other services performed include:

1. Training of water plant operators,

2. Technical consultation with consulting engineers and water supply purveyors on special problems and during emergency conditions, and

3. Assistance to Federal and other State agencies.

Past manpower and budget limitations have prevented the water supply program from meeting these responsibilities. Rules and regulations for protecting public water supplies in Idaho were last adopted by the State Board of Health in 1964. Although these rules and regulations contain standards for both water quality and facility design and construction, they are in need of revision to incorporate new quality criteria and to reflect current construction, operation and maintenance practices.

Necessary routine field inspections of public water supplies and complete and timely reviews of operating report and water quality data have not been accomplished because of restricted manpower. The cross section of public water supplies surveyed during this evaluation showed that 78 percent of the systems had not been surveyed within the previous 12 months and that the average period since the last survey was over 7 years.

Well-written reports, outlining the findings and recommendations of water supply inspections, are essential to obtain desired improvements. However, very few detailed reports have been prepared in recent years. Many of those which have been completed were sent to the communities a number of months after the survey. To be effective, a report should be submitted to the community within a month of the survey while the findings and recommendations are still fresh in the minds of the engineer and the system operator. Follow-up contact with the operator by phone, letter or field survey is important to determine compliance with the recommendations of the survey report. Here again, insufficient manpower has prevented adequate follow-up.

Surveillance of water quality includes review of bacteriological and chemical data as well as routinely submitted operating reports. Very little has been done recently in this area by the water supply program. Although operating records are required by the Idaho Drinking Water Standards (3), few are submitted and little effort is made to encourage more complete reporting. Those reports submitted receive only cursory review by the engineers. The bacteriological sampling program has also suffered from lack of staff. Little effort has been made to ensure that all water supplies are submitting the required number of samples per month. Of the 28 water supplies surveyed during the evaluation, 68 percent had failed to collect the required number of bacteriological samples during 2 or more months of the previous 12 month reporting period.

A copy of each bacteriological analysis is provided to the appropriate regional engineer. The engineer is responsible for following up on unsafe samples and ensuring that resamples are submitted. A review of the bacteriological records revealed that little resampling or investigation was done after a sample showed contamination.

The chemical sampling program has been inadequate also. Of the 28 supplies surveyed 71 percent had not received a chemical analysis within the previous three years. Credability of a chemical sampling program depends not only on the frequency of sampling but also on the completeness of the analyses with respect to the health parameters contained in the standards. Review of the chemical sampling program revealed that, in general, the analyses did not include health parameters such as arsenic, cadmium, chromium, cyanide, lead, silver, etc. Analyses of these parameters is basic in determining the acceptability of the supply for human consumption.

Routine surveillance of communities which adjust the fluoride level in their water supply is important in providing health protection for those served. Regular inspections of the fluoridation installations and frequent check samples of fluoride levels in the system must be conducted to assure proper operation. Review of the water supplies adjusting fluoride levels showed only 13 percent submitting monthly check samples to the State. Results of these check samples are provided to the Dental Health Section. The water supply program was not provided with this information. Inspection visits to the fluoridated water systems by water supply program engineers averaged one visit in five years. The complete report of fluoridation practice in Idaho is included in Appendix B.

Since there are few formal inspections and follow-up surveys of water system facilities and limited review of water quality and operating reports, little enforcement is accomplished. Where changes are implemented, the regional engineer may not return to the system for a year or more to verify that proper action was taken. Enforcement of the Idaho Drinking Water Standards is hampered by the lack of manpower to carryout both field surveys and laboratory analyses as well as by a time consuming, manually operated data recording system.

One responsibility which has been carried out with some degree of regularity by the water supply program is the review of plans and specifications for new construction and modifications to existing water system facilities. This effort, along with providing technical assistance on special problems and emergencies, accounts for the majority of the resource allocation to water supply activities.

The Environmental Protection Division and its predecessor departments conduct an annual three day water supply-wastewater operators short school. The State currently maintains voluntary operators certification programs for both water supply and wastewater operators. As of July 1973, 178 operators representing 38 communities (13%) have been certified under this program. Although the results of these efforts have been beneficial, many of the operators who need the training the most are not attending. This is particularly true for the operators of small systems. These individuals are usually part-time operators or have other responsibilities in the municipality and thus are unable or unwilling to travel long distances or to be away from their job responsibilities to attend training programs of the type necessary as prerequisites for certification.

As noted previously, bacteriological and chemical laboratory support for the water supply program is provided by the Department's Laboratory Section. Facilities and procedures were evaluated at the central bacteriological and chemical laboratories and at two of the five branch bacteriological laboratories. Complete reports for the bacteriological laboratories are included in Appendix C. These reports conclude that the three bacteriological laboratories generally met the provisions of Standard Methods. A number of facility and operational recommendations were made. Primary among these was the need to provide new quarters or increased facilities in Idaho Falls. The report notes the limited facilities could influence the quality of work and reliability of data. On July 1, 1973, the Idaho Falls laboratory moved into new quarters providing twice the space of the previous facility. Additional equipment has also been purchased.

A complete report for the chemical laboratory is included in Appendix D. The report notes that in 1971 the laboratory analyzed samples from only approximately 1/3 of the number of water supplies considered necessary for a minimal operation. Adding to the inadequacy of the chemical surveillance program was the fact that the laboratory routinely analyzed only 11 of the 25 substances included in the Drinking Water Standards. The report concludes that although the equipment is available for carrying out analyses on all but two of the parameters specified in the Drinking Water Standards, more personnel are needed to carry out the analyses of additional chemical parameters and the desired increase in sampling.

PUBLIC HEALTH RISK

Since the middle of the nineteenth century, when Dr. John Snow conducted his classical study on the transmission of cholera through a water supply, it has been generally recognized that disease epidemics can, and do, result from consumption of water containing pathogenic microorganisms. Diseases most commonly associated with drinking water are cholera, typhoid fever, dysentery, and infectious hepatitis. Spread of these diseases occurs most commonly when body wastes from an infected persons are ingested. While person-to-person contact is recognized as the common method of transmission for low incidence levels currently found in this country, the potential for catastrophic epidemics transmitted by drinking water supplies which serve thousands of people remains.

Human body wastes from an infected person, when present in inadequately treated drinking water, have caused waterborne disease outbreaks in Idaho. Three outbreaks involving public water supplies have been reported during the past 15 years. Fortunately, none of the outbreaks resulted in a fatality. The most well documented case occurred in Wilder during April 1958. In this incidence approximately 200-250 persons became ill reportedly suffering from vomiting, headache, fever, and diarrhea. Surveys of the water system showed deficiencies which could have contributed to contamination of the system. Results of bacteriological analyses confirmed the presence of Shigella organisms in the system. The suspected cause of the contamination was a jail cell above an underground water storage reservoir. The jail cell had no toilet facilities and shigella organisms were isolated from floor areas in the cell.

An outbreak of infectious hepatitus occurred in Kamiah during September 1958. At least 50 cases were reported. Sanitary surveys of the system led health officials to list the probable cause as contamination of the spring water supply by septic tank seepage from areas above the spring.

Numerous complaints of summer diarrhea were reported in Rockland during the late 1960's. In June 1970, there were widespread cases of diarrhea in Rockland and, following an epidemological investigation, the cause was attributed to various viruses and bacteria, including salmonella, in the water system. Contamination of the system was the combined result of deteriorated distribution system piping, a high water table, seepage from septic tanks, and low pressure in the system during the period of constructing a new distribution system.

Other illnesses occurring at Strike Dam and at Mack's Inn are suspected to have been caused by drinking water supplies contaminated with sewage. A study of gastroenteritis in the Mack's Inn area in 1946 concluded that the source of infection developed primarily from contaminated water which acted as a reservoir of the infection. Although the native population was not affected, visitors to the area who used the water showed a high rate of illness.

While epidemological records generally do not show widespread incidence of waterborne disease, this may reflect incomplete reporting, inaccurate diagnosis and the fact that much enteric illness is not treated by physicians, rather than an absence of waterborne disease. These circumstances have led some health authorities to suggest that the actual incidence of diseases such as gastroenteritis and infectious hepatitus may be as high as 100 times the number reported.

After reviewing waterborne disease data over the last three decades, Craun and McCabe (6) report that outbreaks are no longer on the decline in the United States. The consistent and dramatic decrease in the number of waterborne outbreaks noted during the period 1938-1955 has reversed and since the period 1951-55 a slight increase has occurred. It is not known if this represents a real increase or is due to improved diagnosis and reporting. The significance, however, is that there appears to be no decline. The authors note that, if similar conditions continue to exist in the future, the current average of one waterborne disease outbreak per month can be expected to continue.

In recent years, concern also has been directed to the possible chronic diseases which may result from use of water containing certain chemicals. These potentially dangerous substances include heavy metals, pesticides and toxic industrial products. Few clinical cases of illness caused by the presence of toxic chemicals in drinking water are recorded. Lack of documentation is not surprising as affected individuals may have unrecognized symptoms and health agency statistics are limited usually to communicable diseases. Heavy metals such as selenium, cadmium, lead, zinc and arsenic occur naturally in the earth and can be present in water sources. Agricultural and industrial discharges contain pesticides and chemicals which may be hazardous to human health. Certainly, it is evident that every water supply serving the public should have a complete chemical analysis performed routinely.

In essentially all documented cases of waterborne illness, definite deficiencies have existed in the water supply systems during the period when the disease was transmitted. Furthermore, these deficiencies either were unrecognized because of inadequate surveillance for public health hazards, or were recognized but not remedied due to ineffective persuasion or enforcement by health officials. Deficiencies similar to those responsible for epidemics definitely are present in the water supplies of Idaho and were found during this study. The requisites for repetition of the waterborne outbreaks of the past, namely the presence of diseased individuals in the State and the inadequate surveillance of public water supplies and inadequate enforcement of public health standards, exist in Idaho. Greater vigilance by Idaho's health officials and the water supply industry will be required to minimize public health risk from drinking water.

PROGRAM NEEDS

Previous sections of this report present the findings of water quality and water system facilities and their relation to the current status of the public water supply program in Idaho. These findings clearly demonstrate that the water supply program is inadequate in the health evaluation and engineering services necessary to provide the level of surveillance required to assure low risk to the citizens of Idaho.

There is a definite need to immediately strengthen all aspects of the State's water supply program. As Idaho's permanent population grows and as more recreational developments are planned, the need for additional resources to insure safe and wholesome drinking water for Idaho's citizens and visitors will become more critical. This section of the report presents necessary improvements to provide Idaho an adequate water supply program.

AUTHORITY

Idaho statutes require protection of all domestic water supplies and provide the Department of Environmental and Community Services with broad regulatory powers to establish and enforce standards, rules and regulations relating to public water supplies. Section 39-103, Idaho Code as amended by the 1973 Idaho legislature now provides an adequate definition of water supplies to be protected under rules and regulations. Particularly significant is the expansion of the definition to include "...any other supply which serves water to the public and which the Department of Environmental Protection and Health declares to have potential health significance." This provides legislative authority for protection of small recreation area water supplies and supplies serving facilities at rest stops, service stations and restuarants along Idaho's highways. Including these installations in the definition of supplies to be protected is the first step toward providing adequate health protection to this class of previously exempted supplies. Other actions necessary for preventing public health problems will be the establishment of a Department policy outlining the specific type of supplies to be covered under the option and the development of standards for design, operation and surveillance of these special classes of supplies. Specific recommendations for development of standards and policy will be discussed later in the report.

Idaho's voluntary water supply operator certification program is inadequate and should be phased into a mandatory program by means of proper legislation. This action will assist in assuring that public water supplies are operated by qualified personnel. To provide for orderly implementation and to prevent the imposition of hardship on smaller communities, an implementation schedule should be developed based on water system complexity. As an example, water systems designated Class I, or most complex, should be required to employ on each shift at least one certified operator within 6 months of passage of the legislation. Similarly, Class II, III and IV supplies should be required to employ at least one certified operator within 12, 18 and 24 months respectively. Regulations should be established to require by some later date minimum numbers of certified operators for the more complex systems.

In view of the considerable benefits of fluoridation, it is recommended that the Department of Environmental and Community Services more actively promote and support fluoridation of community water supplies. Where the fluoridation of an entire community water supply is not feasible, school water supply fluoridation should be considered. Proper fluoridation techniques could be incorporated easily into the State operator certification program. As qualified operators are available and as the Department's surveillance and monitoring activities improve, the program should culminate in enactment of legislation requiring fluoridation of community water supplies not containing dentally significant concentrations of natural fluorides.

No provision is made in the Idaho Code to promote the coordinated planning and development of new public water supply systems and the consolidation of the large number of small supplies existing in certain regions of the State. This lack of authority to promote proper planning has resulted in the proliferation of small public water supply systems which tend to provide poorer quality, less efficient and more costly service to customers. It is recommended, therefore, that legislation be enacted to assure efficient and coordinated development of public water supply systems. Fewer systems also will assist in the orderly and efficient administration of State surveillance programs for public water systems.

REGULATIONS

The most recent revision of the Idaho Drinking Water Standards (3) was adopted in November 1964. These regulations need updating and strengthening to recognize the Department's organizational changes, to require new and modified water quality and monitoring criteria, and to reflect improved water treatment and distribution practices. The following specific recommendations are made for improvement of the regulations.

1. The introduction of the Idaho Drinking Water Standards, which provides quotations of the Idaho statutes upon which the regulations are developed, should be expanded to include recent legislative action impacting the water supply program.

2. References to the powers and duties of the Department, as well as instruction for implementing the regulations, should

be updated to reflect recent organizational changes.

3. The regulations should define the types of waterworks facilities which are considered public water supplies. This definition would go beyond that specified by the legislature to define or categorize the supplies determined by the Department to have potential health significance. Included should be supplies serving facilities such as campgrounds, motels, restaurants, service stations, highway rest stops, etc.

4. Certain portions of the Idaho drinking water quality standards and recommended analytical procedures need revision. For example, the outlined procedures for bacteriological analyses prescribe incubation temperatures and media which are no longer valid. In addition, the definition of a standard bacteriological sample limits the procedure to use of the multiple - tube fermentation test. These portions of the regulations should be revised to incorporate new analytical techniques and to permit increased latitude in bacteriological analyses. Idaho's drinking water quality criteria should be updated to reflect new concerns for the toxicity of chemical contaminants. New standards should be adopted for pesticides, mercury and organics. Others may be altered or deleted. The U.S. Public Health Service Drinking Water Standards (1), upon which the existing Idaho water quality standards are based, are currently under revision. It is recommended that the Department revise the Idaho standards to provide

regulations at least as stringent as the updated Federal standards.

5. Special design and surveillance regulations should be developed for small public water supplies such as those serving recreation facilities, motels and restaurants.

6. Special water quality criteria and surveillance regulations should be developed for bottled water and water bottling facilities.

7. The guidance provided by the current regulations for determining the type of treatment required for a particular source is vague. It is recommended that standards be developed specifying the treatment required for various types of water sources, watershed characteristics and raw water quality. As a minimum, all public water supplies, regardless of source, should receive treatment by disinfection. All supplies utilizing surface water sources should provide filtration in addition to disinfection unless field survey and sampling data substantiate that all source protection and water quality criteria can be met continuously.

8. Bacteriological and chemical sampling frequencies should be updated to reflect expanding system sizes and increased public health concern for chemical contaminants. Specifically, the table or graph of bacteriological sampling requirements should be expanded to illustrate the minimum number of finished water samples required from cities with larger populations. Requirements should also be established for minimum monthly raw water sampling from

surface water supplies. More detail should be incorporated into the requirements describing the frequency and extent of physical, chemical and radiochemical sampling. Consideration should be given to specific requirements or policy based on source and treatment.

9. The current Idaho Drinking Water Standards state that approval of a water supply is based in part upon enforcement of rules and regulations, protection of water quality throughout the entire system, proper operation by qualified operators, adequate capacity and pressure, satisfactory record of laboratory examinations, submission of treatment records, and submittal of plans and specifications for approval prior to construction and extension of water supply systems. The intent of these requirements is commendable. Enforcement authority is lacking, however, as there is no requirement that a public water supply must be approved. It is recommended, therefore, the regulations be revised to eliminate this inadequacy and to strengthen each of the essential program requirements. For example, each purveyor should be required to keep records of operations and analyses as established by the Department. The more complex systems, as defined by the classification system recommended in Item 3, should be required to submit to the Department copies of the reports monthly. The systems also should be required to submit to the Department annual reports summarizing the system's operations, facility

changes, etc. for the preceding year. Regulations for submission of plans and specifications should be strengthened to require their submittal to and written approval from the Department prior to the start of construction.

10. The current regulations covering cross-connection control should be expanded. It is recommended that regulations be developed defining backflow; describing the types of backflow devices acceptable to the Department; defining typical backflow situations and proper protection for each; outlining required minimum testing programs for devices; and defining the responsibility of the purveyor, customer, health officer, and plumbing authority in implementing the regulations.

11. Requirements should be incorporated in the drinking water regulations to assure that provisions are made for proper disposal of water treatment plant wastes such as sanitary, laboratory, clarification, softening, filter backwash and brines. Reference may be made to waste treatment regulations for detailed design and effluent requirements.

POLICY

As the number of individuals in the central and regional offices involved in water supply activities increases, it will become essential to institute a procedure whereby policy is established and documented for reference. The program will be beneficial not only to the Department staff but also to consulting engineers and others preparing plans for construction or modification of water supply systems. It is recommended, therefore, that a program be established to document present and future water supply policy decisions and to prepare and distribute such statements for inclusion in a water supply program policy manual. Program policy statements should be made available to all waterworks industry groups routinely and to individuals upon request.

ACTIVITIES

Engineering Services

Commitments in other environmental programs have caused the water supply surveillance effort to deteriorate steadily until in fiscal years 1971 and 1972 only one man-year was expended for surveillance of the State's 274 public water supplies. Although the resource allocation for water supply activities increased to 2.7 man-years by the end of FY 1973, the effort remains inadequate.

Surveillance activities should be upgraded. There is obvious need for an inventory of all public water supplies in Idaho. Such an inventory has been initiated in conjunction with the national water supply inventory being developed by the U.S. Environmental Protection Agency. There is evidence indicating that the completed Idaho inventory will show a significant increase in the number of known public water supplies for which the Department is responsible. This inventory should be integrated into the water supply program to permit continuous updating.

A comprehensive engineering inspection should be conducted for each water supply at least once per year. A written report should be returned to each supply within a month of the survey while the survey and findings are fresh in the minds of both the regional engineer and the purveyor. Supplies which fluoridate or have serious deficiencies should be surveyed more frequently.

In addition to field inspections, a surveillance program must include bacteriological and chemical monitoring to assure compliance of water quality with established standards. Data collected in the monitoring program are also beneficial in ascertaining trends in water quality and thus help assess the adequacy of present and future treatment needs. Findings of this study show Idaho's water supply monitoring program to be inadequate. Both the bacteriological and chemical sampling programs must be improved. Additional emphasis should be placed on assuring that at least the minimum number of bacteriological samples is collected monthly from each public water supply, that bacteriological laboratory results are systematically reviewed and recorded, and that a resampling program for unsatisfactory samples is carried out in accordance with the drinking water standards. This program will require improved coordination with the Laboratory Section.

The chemical sampling program for drinking water supplies should be expanded to assure not only compliance with the minimum sampling frequency but also inclusion of all constituents listed in the drinking water standards. It is recommended that chemical samples be collected and analyzed from each system according to the following schedule unless more frequent analyses are indicated by the presence of excessive levels of harmful constituents:

1. Surface (river or lake) - at least once per year, and
2. Ground (well or spring) - at least triennially.

New sources should be sampled more frequently than the above schedule until a satisfactory data base is established. If no problems are evident sampling should then revert to the routine schedule. In addition, all public water supplies should be analyzed triennially for radiochemical constituents contained in the drinking water standards.

Programs to prevent contamination of drinking water systems from actual or potential backflow conditions have not been actively pursued in Idaho. It is recommended that a program be established to encourage adoption of local cross-connection control ordinances and institution of viable surveillance programs for elimination of backflow conditions. The water supply program should establish guidelines for local programs, maintain lists of acceptable backflow prevention devices, establish testing procedures and frequencies for backflow devices, and develop specialized training programs for cross-connection surveillance and for certification of backflow prevention device testors.

A specialized fluoridation surveillance program should be initiated. The program should include routine surveillance and technical assistance to supplies adjusting the fluoride content of their water and closer surveillance of water supplies with naturally occurring high fluoride content. Responsibility for monitoring the fluoride check sampling activity should be relocated from the dental health to the engineering surveillance program.

Bottled water sales have not been considered a significant aspect of the Idaho drinking water surveillance program. There are no specific State standards regulating bottling practices or the quality of bottled water. Current evaluation procedures are to judge bottling practices against State regulations for food preparation establishments and bottled water quality against drinking water standards criteria. Little surveillance of either bottlers or finished water quality has been provided. It is recommended that increased coordination be maintained between the State water supply and food service programs to assure that bottled water complies with the same health related constituent limits and monitoring requirements which are applicable to drinking water.

Operator training and certification activities should be expanded. The State's current operator training program is not reaching the operators who most need the training. Findings of the evaluation show only 29% of the operators interviewed had received training through the short school program. Those not receiving short school training were found to operate the smaller size, poorer quality systems. It is recommended, therefore, that a more flexible program be established to meet the needs and commuting schedules of both full and part-time operators. It is also recommended that the Department work closely with the State universities and community colleges to establish entry level and upgrade operator training programs.

Approximately 180 operators have been certified under the current voluntary water supply certification program. These 180 operators represent 38 utilities or 14 percent of the total number of municipal water supplies in the State. It is recommended that the Department continue the present voluntary certification program at an increased level of activity and work actively for passage of a mandatory certification program by the legislature.

Successful administration of a water supply surveillance program requires the accumulation, processing, analyses and retrieval of large quantities of information. Data storage and retrieval are currently accomplished manually. The growing quantity of water quality data, engineering inspection report information, inventory data, and monthly operating report records expected as the water supply program effort increases will require reorganization of this activity under a computerized system and the services of a system analyst. It is recommended that the water supply program utilize the existing State's computer capability on a time sharing plan with other State programs.

The primary need of the engineering services portion of the water supply program is sufficient numbers of thoroughly trained, strategically located personnel to fulfill its responsibilities. Staffing needs will require personnel to carry out standards revision, planning, surveillance, training, and technical assistance activities of the program plus secretarial support. Environmental Protection Agency experience in working with State water supply programs has been used to develop estimated personnel needs and program costs for an effective water supply program in Idaho. Assumptions used and calculations made are included in Appendix E. In summary, it is recommended that the total manpower allocations for engineering services be 6 man-years of professional staff and 2 man-years of secretarial support. Direct program cost for these services is estimated at $128,000 annually. Management and overhead costs for engineering add approximately $26,000 to the overall surveillance program operations cost.

Laboratory Support-Bacteriological

A strong bacteriological surveillance effort is an essential part of a State water supply program. Bacteriological monitoring is considered to be an operational procedure to be performed at the expense of the water supply purveyor. The State is responsible for performing a minimum number of analyses to assure that the analyses performed by the purveyor are properly performed. It is recommended that the State of Idaho establish a self-supporting bacteriological surveillance program. Water supply purveyors should be encouraged to develop their own bacteriological monitoring capability or should be charged to cover the cost of analyses at State laboratories. The State should establish a program to examine monthly from each system either five percent of the minimum number of distribution system samples required by drinking water standards or two samples, whichever is greater. Cost of this check sampling program should be borne by the State.

The State should also perform periodic surveys of all laboratories utilized by purveyors of public drinking water. This surveillance should be provided at least triennially.

It is estimated that the cost of both the check sampling program and the laboratory surveillance activity would be $36,000 per year. Management and overhead will add approximately 20 percent to the overall program cost. Assumptions and calculations upon which the above figures are based are presented in Appendix E.

Laboratory Support-Chemical

The performance of chemical analyses for operational control and special analyses for contaminants known to be present at levels approaching established drinking water standards are considered to be the responsibility of the water supply purveyor. The State should be responsible for sufficient sampling and analyses to ensure that water of satisfactory chemical quality is delivered to consumers served by public water supply systems.

It is recommended that the State chemical laboratory analyze all drinking water standards constituents in accordance with the sampling frequency previously recommended for ground and surface water supplies. This will require considerable increase in the number of constituents routinely analyzed, additional professional and technician personnel, and additional space and equipment.

The State should also perform periodic surveys of all laboratories utilized by purveyors of public drinking water. It is estimated that there will be few laboratories in the State equipped or staffed to analyze all drinking water standards constituents. Therefore, the cost for the chemical quality control program will not be great. The smaller water utility laboratories equipped for physical and chemical analyses for operational control should be evaluated by State agency personnel during the routine annual sanitary survey of the utility.

It is estimated that the cost of both the laboratory surveillance and chemical sampling programs would be $35,000 per year.

Management and overhead will add an additional 20 percent to the overall program cost. Assumptions and calculations upon which the above figures are based are presented in Appendix E.

District Health Departments

Experience has shown that strong local health agencies can be instrumental in improving private, small public, and recreational water supply systems within their area of jurisdiction. Since they have a smaller area to cover, the local staff can provide surveillance and technical assistance more readily than the State. There are seven such Health Districts in Idaho. It is recommended that the State develop a memorandum of agreement with each of the Health Districts for surveillance of and technical assistance to these type water supplies in Idaho. The agreements should be tailored to the manpower and water supply experience capabilities of each individual Health District. They should identify the size and class of systems for which the Health District will be responsible and specify that Health District regulations and policy be at least as stringent as those adopted by the State.

In addition to their responsibilities for surveillance of the smaller water supplies, the Health Districts could improve the overall water supply program by:

1. Assisting in developing and maintaining an up-to-date inventory of all public water suppies,

2. Assisting with bacteriological and chemical sampling programs,

3. Assisting with enforcement of well construction standards,

4. Assisting in special studies, and

5. Providing immediate follow-up assistance on water supply problems.

It is recognized that a certain amount of technical assistance will be required from the State's water supply program staff to support the Health Districts. In fact, the Health District's may desire to turn responsibility for surveillance of some of the more complex small water supply systems back to the State. Overall, however, proper utilization of the Health Districts will greatly broaden the public health protection provided for water supplies in Idaho.

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PARTICIPANTS

The following persons and/or agencies made major contribution to the successful completion of this study.

Study Director

William A. Mullen, Chief, Water Supply Unit
Air & Water Programs Division, EPA, Region X, Seattle

Study Advisor

Francis L. Nelson, Chief, Technical Support Branch
Surveillance and Analysis Division, EPA, Region X, Seattle

Field Evaluation

Howard L. Burkherdt, Regional Environmental Engineer,
Idaho Department of Environmental Protection & Health, Pocatello 1/

Thomas N. Hushower, Chief, Special Studies Section
Water Supply Division, EPA, Washington, D.C.

Earl F. McFarren, Supervisory Chemist, Standards Attainment Branch
Water Supply Research Laboratory, NERC, EPA, Cincinnati

William A. Mullen, Chief, Water Supply Unit
Air & Water Programs Division, EPA, Region X, Seattle

Harry D. Nash, Microbiologist, Standards Attainment Branch
Water Supply Research Laboratory, NERC, EPA, Cincinnati

Francis L. Nelson, Chief, Technical Support Branch
Surveillance and Analyses Division, EPA, Region X, Seattle

Jeffrey T. Pearlman, Dental Technician, Dental Health Section
Idaho Department of Environmental Protection & Health, Boise 1/

James E. Warren, Staff Engineer, Surveillance and Technical Assistance Section
Water Supply Division, EPA, Washington, D.C.

Arthur W. Van't Hul, Regional Environmental Engineer
Idaho Department of Environmental Protection & Health, Lewiston 1/

Jerry L. Yoder, Regional Environmental Engineer
Idaho Department of Environmental Protection & Health, Boise 1/

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Laboratory Support

Fluoride Laboratory, Water Supply Division, EPA, Washington, D.C.

Cincinnati Water Hygiene Laboratory, EPA, Cincinnati, Ohio [2]

Gulf Coast Water Hygiene Laboratory, EPA, Mobile, Alabama [3]

Northeast Water Hygiene Laboratory, EPA, Narragansett, Rhode Island [3]

Northwest Water Hygiene Laboratory, EPA, Gig Harbor, Washington [3]

Southwest Radiological Health Laboratory, EPA, Las Vegas, Nevada [4]

Idaho Department of Environmental Protection & Health Laboratory, Boise [1]

Idaho Health District Laboratory, Coeur d'Alene

Idaho Health District Laboratory, Idaho Falls

Idaho Health District Laboratory, Lewiston

Idaho Health District Laboratory, Pocatello

Idaho Health District Laboratory, Twin Falls

Data Processing -Water Supply Division, Data Processing Unit, Cincinnati

Grace D. Bardo, Statistical Clerk

Arthur F. Hammonds, Computer Systems Analyst

George C. Kent, Chief, Water Quality Register Branch

Richard L. Manning, Computer Systems Analyst

Report Preparation

Karen M. Ihrig, Principal Typist

William A. Mullen, Chief, Water Supply Unit

Francis L. Nelson, Chief, Technical Support Branch

1/ Agency subsequently renamed Idaho Department of Environmental and Community Services.

2/ Laboratory subsequently renamed Water Supply Research Laboratory, National Environmental Research Center-Cincinnati.

3/ Laboratory subsequently consolidated with Water Supply Research Laboratory, NERC-Cincinnati.

4/ Laboratory subsequently renamed National Environmental Research Center-Las Vegas.

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APPENDIX A

SUMMARY TABLES

WATER SUPPLIES STUDIED

APPENDIX A
TABLE I
PUBLIC WATER SYSTEMS STUDIED

SYSTEM NUMBER	NAME OF SYSTEM	POPULATION SERVED	AVERAGE DAILY DEMAND (MGD)	SOURCE	TREATMENT[1/]
1	Boise Water Corporation	75,000	16.00	38-Wells	PD
2	Lewiston	12,600	3.80	Clearwater R. 3-Wells	CSFDL$_A$Fl
3	Grangeville	3,636	0.55	4-Wells 2 Springs	D
4	St. Anthony	2,877	0.80	4-Wells (1 Standby)	None
5	St. Maries	2,571	Unknown	Rochat Creek St. Joseph River (Standby)	D
6	Aberdeen	1,542	Unknown	3-Wells	None
7	Arco	1,244	Unknown	4-Wells	None
8	Council	899	Unknown	3-Springs 2-Wells	DFl
9	Potlatch	871	0.07	4-Wells (2 Standby)	None
10	Ririe	575	Unknown	2-Wells	None
11	Horseshoe Bend	511	Unknown	4-Wells	None
12	Hagerman	436	Unknown	Spring	D
13	Franklin	400	Unknown	6-Springs	None
14	Lapwai	400	Unknown	2-Wells	Fl

TABLE I (Cont'd)

NO.	NAME OF SYSTEM	POPULATION SERVED	AVERAGE DAILY DEMAND (MGD)	SOURCE	TREATMENT 1/
15	Hazelton	396	Unknown	2-Wells	D
16	Firth	362	Unknown	2-Wells	None
17	Arimo	252	Unknown	Springs & Well	None
18	Rockland	209	0.046	2-Wells	D
19	Moyie Springs	203	0.04	Springs	Some D
20	Athol	190	Unknown	Well (1 Standby)	None
21	Midvale	176	Unknown	2-Wells	None
22	East Hope	175	0.02	Creek	FD
23	Castleford	174	Unknown	Well	D
24	Stanley Pond Water Assn.	100	Unknown	Well	None
25	Murphy	75	Unknown	2-Wells	None
26	Hope	63	Unknown	Spring	None
27	Hollister	57	Unknown	2-Wells	None
28	Eugene Outlook Water Association	40	Unknown	Well	None

1/ A - Aeration
C - Coagulation
S - Sedimentation
F - Filtration
D - Disinfection
L - Lime
L_A- Soda Ash
Fl- Fluoridation
P - Phosphates

APPENDIX A
TABLE II
WATER QUALITY - PUBLIC WATER SYSTEMS

SYSTEM NUMBER	BACTERIOLOGICAL STANDARDS NOT MET				CHEMICAL STANDARDS NOT MET 3/			
	DURING SURVEY 1/		DURING YEAR 2/		RECOMMENDED		MANDATORY	
	Number Samples	Density >4/100ml	Average Density	Months	Plant	Dist. Sys.	Plant	Dist. Sys.
1	12	0	0.0	0-12	Fe (0.77 & 0.55 & 1.80) Mn (0.054 & 0.79 & 0.053 & 0.13 & 0.36 & 0.055 & 0.098 & 0.13) Color (30)	0	0	0
2	4	0	0.0	0-12	0	0	0	0
3	3	0	0.7	0-12	Fe (1.40 & 0.65)	0	0	0
4	2	0	0.0	0-10	0	0	0	0
5	2	0	0.0	0-8	0	0	0	0
6	3	0	0.0	0-5	Fe (2.2 & 4.1) Mn (0.07)	0	0	0
7	2	0	0.0	0-10	0	0	0	0
8	2	0	0.0	2-8	0	0	0	0
9	2	0	1.1	1-7	0	0	0	0
10	1	0	0.0	1-6	0	0	0	0
11	2	0	0.0	0-5	0	0	0	0
12	3	0	0.0	2-5	0	0	0	0

APPENDIX A - TABLE II (CON'T)

SYSTEM NUMBER	BACTERIOLOGICAL STANDARDS NOT MET				CHEMICAL STANDARDS NOT MET 3/			
	DURING SURVEY 1/		DURING YEAR 2/		RECOMMENDED		MANDATORY	
	Number Samples	Density >4/100ml	Average Density	Months	Plant	Dist. Sys.	Plant	Dist. Sys.
13	2	1	4.6	No Samples	0	0	0	0
14	2	0	0.0	0-8	0	0	0	0
15	2	2	12.6	2-11	As (.012)4/ Mn (.063)	0	Se (.017)4/	0
16	1	0	0.0	0-11	0	0	0	0
17	2	0	0.0	0-3	0	Zn (18.3)	0	0
18	2	0	0.0	0-7	0	0	0	0
19	2	0	0.0	1-10	0	0	0	0
20	2	0	0.0	0-12	0	0	0	0
21	2	0	0.0	0.4	0	0	0	0
22	2	0	0.0	0-12	0	0	0	0
23	2	0	0.0	0-11	As (.02)4/ TDS (662.0)4/	0	0	0
24	1	0	0.0	0-12	0	0	0	0
25	2	0	0.0	No Samples	0	0	0	0
26	2	2	14.0	6-6	0	0	0	0
27	3	1	3.0	1-4	0	F (2.2)5/	0	0
28	1	0	0.0	0-12	0	0	0	0

Footnotes

1/ Distribution Samples Only

2/ State Health Dept. Monthly Summary Data - may contain treated water from source as well as distribution samples.

3/ Only chemical constituents failing to meet the Drinking Water Standards are shown. Color expressed in standard units, all others in mg/l.

4/ Constituent not measured in distribution system.

5/ Constituent not measured at source.

APPENDIX A

TABLE III

WATER SUPPLY FACILITIES APPRAISAL

SYSTEM NUMBER	SOURCE	TREATMENT	DISTRIBUTION	QUALITY CONTROL	RISK FACTOR
1	A	A	A	I	3
2	I	A	I	A	2
3	I	A	I	I	4
4	A	N/A	I	I	3
5	I	A	I	I	5
6	A	N/A	A	I	2
7	I	N/A	A	I	5
8	I	I	I	I	8
9	A	N/A	I	I	3
10	A	N/A	I	I	4
11	I	N/A	A	I	5
12	A	A	A	I	2
13	I	N/A	A	I	7
14	A	N/A	A	I	2
15	I	I	I	I	6
16	I	N/A	A	I	3
17	A	I	A	I	4
18	A	A	A	I	2
19	I	I	A	I	6
21	A	N/A	A	I	2
22	I	A	A	I	3
23	I	A	A	I	4
24	A	N/A	A	I	1
25	A	N/A	I	I	3
26	I	N/A	I	I	8
27	I	N/A	I	I	7
28	A	N/A	I	I	3
Percent Inadequate	50%	33%	39%	96%	Avg. = 3.9

Key: A - Adequate
I - Inadequate
N/A - Not Applicable

1/ Weighted numerical rating assigned by survey engineer. A rating of 1 equals least public health risk and 10 equals high public health risk.

APPENDIX A
TABLE IV
PUBLIC WATER SUPPLY SURVEILLANCE

SYSTEM NUMBER	BACTERIOLOGICAL LABS		BACTERIOLOGICAL SAMPLES			MONTHS WITHOUT SAMPLES	YEARS SINCE LAST	
	TYPE	CERTIFIED	REQUIRED Per Month 1/	NUMBER EXAMINED			SHD SURVEY	CHEMICAL ANAL.
				Avg. 2/	Range/Month			
1	SHD 3/	SHD-EPA 4/	90	100	80-150	0	1	1
2	SHD	SHD	18	25	18-28	0	1	2
3	SHD	SHD	4	2	2	0	4	4
4	SHD	SHD	2	2	0-2	2	7	7
5	SHD	SHD	2	1	0-2	4	4	4
6	SHD	SHD	2	1	0-2	7	1	1
7	SHD	SHD	2	2	0-4	2	8	10
8	SHD	SHD-EPA	2	1	0-4	4	11	14
9	SHD	SHD	2	1	0-2	5	2	3
10	SHD	SHD	2	1	0-2	6	5	7
11	SHD	SHD-EPA	2	1	0-4	7	6	none
12	SHD	SHD-EPA	2	1	0-2	7	16	10
13	SHD	SHD	2	0	0	12	12	16
14	SHD	SHD	2	1	0-2	4	1	1
15	SHD	SHD	2	2	0-2	1	2	1
16	SHD	SHD	2	2	0-4	1	5	25

APPENDIX A - TABLE IV
PUBLIC WATER SUPPLY SURVEILLANCE (CON'T.)

SYSTEM NUMBER	BACTERIOLOGICAL LABS		BACTERIOLOGICAL SAMPLES			MONTHS WITHOUT SAMPLES	YEARS SINCE LAST	
	TYPE	CERTIFIED	REQUIRED Per Month 1/	NUMBER EXAMINED Avg.2/	Range/Month		SHD SURVEY	CHEMICAL ANAL.
17	SHD	SHD	2	1	0-2	9	17	19
18	SHD	SHD	2	1	0-6	5	7	11
19	SHD	SHD	2	2	0-4	2	14	14
20	SHD	SHD	2	2	2	0	11	11
21	SHD	SHD-EPA	2	1	0-2	8	1	1
22	SHD	SHD	2	2	2	0	2	
23	SHD	SHD	2	2	0-4	1	10	17
24	SHD	SHD-EPA	2	2	2	0	8	4
25	SHD	SHD-EPA	2	0	0	12	17	17
26	SHD	SHD	2	2	0-4	6	14	14
27	SHD	SHD	2	1	0-2	8	13	13
28	SHD	SHD-EPA	2	2	2	0	1	1
						No. Deficient 5/ = 19	No.>1 = 22	No.>3 = 20

1/ Minimum number of samples required to meet Drinking Water Standards.
2/ Average number examined/month during the 12 month period proceeding the study rounded to the nearest whole number.
3/ SHD - State Health Department
4/ EPA - Environmental Protection Agency
5/ Number failing to collect sufficient bacteriological samples two or more months during 12 month period.

APPENDIX B

ADEQUACY OF THE WATER FLUORIDATION CONTROL PROGRAM IN IDAHO

Adequacy of the Water Fluoridation
Control Program in Idaho

An Evaluation of the Water Fluoridation Installations in the State of Idaho

Thomas N. Hushower
Thomas N. Hushower, P.E.
Chief, Special Studies Section
Office of Water Programs Operations
Environmental Protection Agency

IDAHO WATER SUPPLY PROGRAM EVALUATION

ADEQUACY OF THE WATER FLUORIDATION CONTROL PROGRAM IN IDAHO

Introduction

The Idaho State Board of Health by a Resolution on Fluoridation, approved August 6, 1966, "recommends and encourages the adoption of controlled fluoridation in communities with public water supplies" as an important public health measure for the prevention of tooth decay. Section 37-2102 of the Idaho Code requires that the standards for chemical (including fluorides) and bacterial purity of the public water supplies in Idaho shall be consistent with the Drinking Water Standards of the U.S. Public Health Service. Construction and design standards for fluoridation installations in the State and operating and control procedures for the facilities are outlined in Part XII - Fluoridation of Public Water Supplies, of the Idaho Drinking Water Standards. Responsibility for the approval and surveillance of the fluoridation installations rests with the Environmental Improvement Division of the Department of Health. There is no State law requiring the fluoridation of public water supplies, however, legislation (HR #515) has recently been introduced to amend the State Code to provide for the fluoridation of all water supply systems serving more than one hundred (100) residences.

On October 1, 1971, fourteen public water supply systems were reported by the Department of Health to be fluoridating out of a total of 280 public water supplies in the State. 1/ Field visits to the fourteen supplies,

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1/ Water supply systems serving populations of twenty-five or more.

however, revealed only eight fluoridation installations were in operation. The fluoridation practices at six water supply systems at the time of the survey had been discontinued for various reasons. Figure 1, Fluoridation Water Supply Systems in Idaho, locates the fourteen reported fluoridated water supplies in the State and Table I summarizes pertinent information on each supply. Thirty-four communities were using one or more water sources containing natural fluorides of 0.7 mg/l or higher; and, seven communities (Buhl, Bruneau, Filer, Grand View, Hollister, Newdale and Teton) were using one or more water sources containing natural fluorides of greater than 2.0 mg/l fluoride. [2]

Evaluation Procedures

To evaluate the adequacy of the Idaho water fluoridation control program, the eight fluoridated public water supply systems in the State operating under the approval of the Department of Health were examined with respect to: fluoride content in the distribution system; analytical control of the fluoride level; fluoride feed equipment and facilities; fluoride compound-storage and handling; operator training and interest; and, surveillance. A field inspection visit was conducted at each of the eight fluoridated water systems in operation, survey forms were completed [3] and water samples for fluoride ion analysis were collected. Officials in charge of the installations were given advance notice of the visit.

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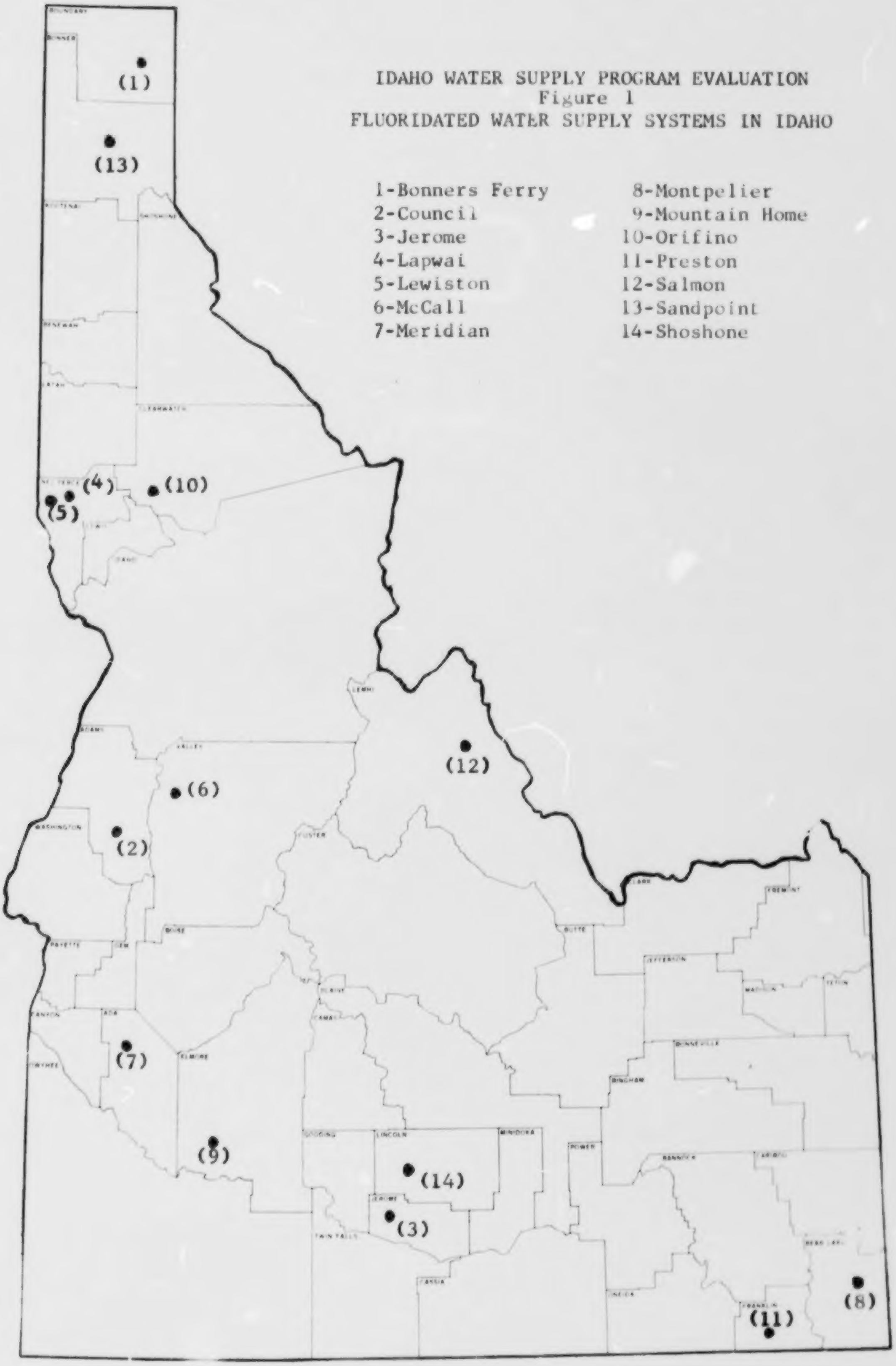
[2] 1968 Compilation of Chemical Analysis of Public Water Supplies in the State of Idaho, Idaho State Department of Health.

[3] A copy of the questionnaire used in the Idaho Fluoridation Survey is appended.


BOUNDARY
BONNER
(1)
(13)
KOOTENAI
SHOSHONE
BENEWAH
LATAH
CLEARWATER
NEZ PERCE
(4)
(10)
(5)
LEWIS
IDAHO
LEMHI
ADAMS
VALLEY
(12)
(6)
WASHINGTON
(2)
CUSTER
CLARK
FREMONT
PAYETTE
GEM
BOISE
BUTTE
JEFFERSON
MADISON
TETON
CANYON
ADA
BLAINE
CAMAS
(7)
BONNEVILLE
OWYHEE
ELMORE
BINGHAM
GOODING
LINCOLN
MINIDOKA
POWER
BANNOCK
CARIBOU
(9)
(14)
JEROME
(3)
TWIN FALLS
BEAR LAKE
CASSIA
ONEIDA
FRANKLIN
(11)
(8)

IDAHO WATER SUPPLY PROGRAM EVALUATION
Figure 1
FLUORIDATED WATER SUPPLY SYSTEMS IN IDAHO

1-Bonners Ferry
2-Council
3-Jerome
4-Lapwai
5-Lewiston
6-McCall
7-Meridian
8-Montpelier
9-Mountain Home
10-Orifino
11-Preston
12-Salmon
13-Sandpoint
14-Shoshone

Idaho Water Supply Program Evaluation
TABLE I
FLUORIDATED WATER SUPPLY SYSTEMS IN IDAHO

Water Supply System	Location (County)	Date of Fldn.	Population Served	Source of Supply	Avg. Flow (MGD) 1/	Fluoride Compound	Type of Feeder	Analysis Method	Test Equip.
Bonners Ferry	Boundary	8/52	2,500	Myrtle Creek & Kootenai R.	0.50 W 2.00 S	VS	V-1	SS	T-1
Council	Adams	1/54	1,000	2-Wells & 3 Sprs.	0.52	VT	P-1	3/	3/
Jerome	Jerome	7/58	4,200	2-Wells	0.40 W 1.20 S	VS	VE-1	SS	T-1
Lapwai	Nez Perce	6/71	400	2-Wells	0.33 4/	VT	PS-1	S	T-3
Lewiston 2/	Nez Perce	6/47	12,000	Clearwater R.& 1-Well	4.20	VS	V-1	SS	T-2
McCall	Valley	1/52	2,000	Payette Lake	1.08	VS	V-2	3/	3/
Meridian	Ada	12/54	2,600	4-Wells	1.17	VT		SS	T-1
Well #2							P-2		
Well #3							P-2		
Well #5							P-2		
Well #6							P-2		
Montpelier	Bear Lake	7/53	2,640	13-Springs & 3-Wells	1.73 4/	VS	VE-1	S	T-3
Mountain Home	Elmore	11/57	7,000	8-Wells	2.50	VS	5/	SS	T-1
Orifino	Clearwater	4/54	3,800	Clearwater R.	0.53	VS	V-4	SS	T-2
Preston	Franklin	1/52	3,500	Berquist Spr.	1.20	VS	VE-1	3/	3/
Salmon	Lemhi	9/52	2,940	Jesse Creek & Pollard Creek	4.75 4/	VS	V-1	S	T-3
Sandpoint	Bonner	4/52	4,500	Sand Creek Pend Oreille Lake	1.70 W 3.60 S	VS	V-3	S	T-3
Shoshone	Lincoln	7/55	1,300	2-Wells	0.50	VS	VE-1	3/	3/

Fluoride Compound:
VS - Sodium Silicofluoride
VT - Sodium Fluoride

Analysis Method:
S - SPADNS
SS - Scott-Sanchis

Test Equipment:
T-1 Color Comparator - Hellige Aqua Tester
T-2 Nessler Tubes, 100 ml
T-3 Photometer - Hach DR-A

Type of Feeder:
V-1 Volumetric - W&T A-378 Roll Type
V-2 Volumetric - W&T A-635 Screw Type
V-3 Volumetric - W&T A-690 Screw Type
V-4 Volumetric - BIF 50-A Rotating Disk
VE-1 Volumetric - W&T A-378 Roll Type; Eductor
P-1 Piston Pump - W&T M-902
P-2 Diaphram Pump - W&T A-747 Metering Pump
PS-1 Diaphram Pump - W&T A-745 Metering Pump; W&T Saturator

1/ W - Winter; S - Summer
2/ Two Water Systems - Lewiston Orchards' System is not Fluoridated
3/ No Fluoride Analysis Conducted by Operator
4/ Plant Capacity - No Flow Records Kept by Operator
5/ Fluoridation Discontinued April 1971 - Equipment Dismantled

The actual level of fluoride ion in the distribution system is the single most important factor in evaluating the adequacy of a community water fluoridation effort and hence in evaluation of the state program responsible for approval and surveillance of the installation. However, as distribution system samples collected on one particular day may not give a true picture of day-to-day operating conditions at the facilities, the installations were further evaluated with respect to the following:

- I. Analytical Control of the Fluoride Level
    - A. Were the fluoride ion analyses conducted at the water plant accurate within ± 0.1 mg/l of the value determined by the EPA Water Supply Programs Division?
    - B. Were finished water samples analyzed daily or more frequently for fluoride ion content?
    - C. Were raw water samples analyzed regularly for fluoride ion content?
    - D. Were laboratory equipment and facilities at the water plant adequate to conduct fluoride ion analysis according to one of three standard methods?
    - E. Was laboratory equipment clean and given responsible care?
    - F. Were complete records kept of the fluoridation operation?
- II. Fluoride Feed Equipment and Facilities
    - A. Were the fluoride feed equipment and facilities adequate to control the fluoride ion level in the finished water?

B. Was positive protection provided against overfeeding? Was equipment location and point of fluoride chemical application at the best practical site? Was backflow protection provided? Was the feed equipment site uncluttered?

C. Was the fluoride chemical feed installation operated continously for the past twelve months without an interruption of more than one day?

D. Were the fluoride chemical feed equipment and facilities maintained satisfactorily?

III. Fluoride Compound - Storage and Handling

A. Was the fluoride chemical compound stored in a safe, protected and orderly manner?

B. Was safety equipment available and were safe procedures followed in handling the fluoride chemical compound?

C. Were fluoride chemical shipping containers disposed of satisfactorily or re-used only for fluoride chemical storage?

IV. Operator Training and Interest

A. Was the treatment plant operator well-trained to operate the fluoride chemical feed equipment and facilities?

B. Was the individual conducting the fluoride ion analyses knowledgeable of his test equipment and standard procedures for analysis?

C. Was the water plant official interviewed in favor of fluoridation and was he interested in adding fluorides to public water supply systems?

V. Surveillance

A. Were check samples for fluoride ion analysis submitted to the State as required?

B. Had the water fluoridation installation surveyed been inspected in the past twelve months by a representative of the State water supply program surveillance agency?

Summary of Findings

Data collected on the water supply systems fluoridating in the State of Idaho indicated only two (25 percent) of the eight installations fluoridating at the time of the survey evidenced a fluoride ion content in the distribution system within a range of 0.8 - 1.3 mg/l. 4/ Five (63 percent) of the eight installations were underfeeding, i.e., the fluoride ion levels in the samples collected from the distribution systems were less than 0.8 mg/l, and two installations (25 percent) were overfeeding. Water samples collected from one system (Preston) were both above and below the recommended fluoride ion level. Table II, Analysis Of Samples From Fluoridated Water Supply Systems, tabulates the fluoride ion analysis results of the water samples collected at each facility surveyed.5/

The operating conditions observed at the eight fluoridation installations inspected during the time of the survey are summarized as follows:

4/ 1962 Drinking Water Standards for an annual average maximum daily air temperature of 63.1°F (Boise, Idaho 30-yr. Avg. 1931-60).

5/ Water samples were analyzed for fluoride ion content by the Water Supply Division, Environmental Protection Agency, Washington, D. C. using the Electrode Method.

TABLE II
ANALYSIS OF SAMPLES FROM FLUORIDATED WATER SUPPLY SYSTEMS

(Fluoride, mg/1)

Water Supply System	Date of Sample	Raw Water	Check Samples (Operator)	Check Samples (EPA)	Distribution System	
Bonners Ferry	12/1	0.05	1.1	1.25	1.35	1.35
Council	11/29	0.23	1/		0.28	0.45
Jerome 2/	10/20					
Well #1		0.46				
Well #2		0.47				
Lapwai 3/						
Lewiston	11/30	0.15	1.1	0.95	1.00	1.10
McCall 4/	11/29	0.06	1/		0.04	0.04
Meridian	10/19				0.87	0.60
Well #2		0.17	1.2	1.00		
Well #3		0.16	0.8	0.79		
Well #5		0.14	1.0	1.13		
Well #6		0.30	1.6	0.39		
Montpelier	10/21	0.15	0.62	0.13	1.25	0.69
Mountain Home 5/						
Orifino	11/30	0.13	0.3	0.15	0.16	0.66
Preston	10/21	0.04	1/	0.76	0.17	1.70
Salmon 6/	10/22	0.05				
Sandpoint	12/2	0.04	1.23	1.17	1.17	1.17
Shoshone 7/	10/20	0.20	1/			

1/ No fluoride analysis conducted by operator.
2/ Fluoridation discontinued Oct. 16, 1971 - Chlorinator repairs required
3/ Fluoridation discontinued approx. June 25, 1971, (2 wks after start up) - Well pump failure & indifference.
4/ Fluoridation discontinued approx. Nov. 15, 1971 - Equipment repairs required.
5/ Fluoridation discontinued April 1971 - Equipment dismantled
6/ Fluoridation discontinued April 14, 1971 - Equipment repairs required and indifference
7/ Fluoridation discontinued Sept. 11, 1971 - Chlorinator repairs required.

I. Analytical Control of the Fluoride Level

Practices to analytically test and control the fluoride ion level in the water distribution systems varied considerably. Only three (50 percent) of the plant operators conducting fluoride ion analysis were within ± 0.1 mg/l of the sample results analyzed by the EPA, Water Supply Division. The operators at two of the eight installations surveyed (Council and Preston) were not conducting fluoride ion analysis and had no test equipment or facilities to analyze water samples for fluoride ion content. The operators of the two facilities reported sending one sample per month to the State Lab for analysis; however, State Health Department records for 1970 showed only three samples from one system and eleven from the other were received during the year for fluoride ion analysis.

Standard Methods or modified versions of the three Standard Methods were used by each operator conducting fluoride ion analysis; however, daily finished water fluoride ion analysis was conducted at only three (38 percent) of the eight installations and no operator was analyzing raw water for fluoride ion content on a regular basis. Adequate analytical equipment and facilities were available at four (50 percent) of the installations visited and care for laboratory equipment was judged satisfactory at only three (50 percent) of the plants where fluoride ion analysis was conducted. Records of the fluoridation operation were acceptable at three (38 percent) of the facilities surveyed.

II. Fluoride Feed Equipment and Facilities

Fluoride chemical feed equipment and facilities were found deficient at four (50 percent) of the eight installations surveyed and only five (63 percent) of the feeding arrangements were acceptable, i.e. protected against overfeeding, preferred point of chemical application, protected against backflow, and good housekeeping in the feeder area. One (13 percent) of the operators reported one or more interruptions in fluoridation of one or more days duration in the past twelve months. Maintenance was judged satisfactory at only four (50 percent) of the facilities surveyed even though the plant operators had been alerted to the inspection visit.

III. Fluoride Compound - Storage and Handling

Storage arrangements for the fluoride chemical compound fed were unsatisfactory at four (50 percent) of the eight installations surveyed. Six (75 percent) of the operators interviewed did not have available or were not using safety equipment in handling the fluoride chemical compounds. All the operators reported satisfactory disposal practices for the empty fluoride chemical shipping containers. Only sodium fluoride and sodium silicofluoride were being used as a source of fluoride ion at the installations surveyed.

IV. Operator Training and Interest

A trained operator with a geniune interest in feeding fluorides is essential to the satisfactory operation of a fluoridation installation. Two (25 percent) of the facilities surveyed were operated by personnel not completely familar with the fluoride chemical feed equipment at their plants. The operators at three (50 percent) of the facilities conducting fluoride ion analysis were not adequately trained in the use of the fluoride ion test equipment provided and the procedures to follow in conducting a fluoride ion analysis. Three (38 percent) of the eight operators questioned did not favor feeding fluorides to public water supply systems.

V. Surveillance

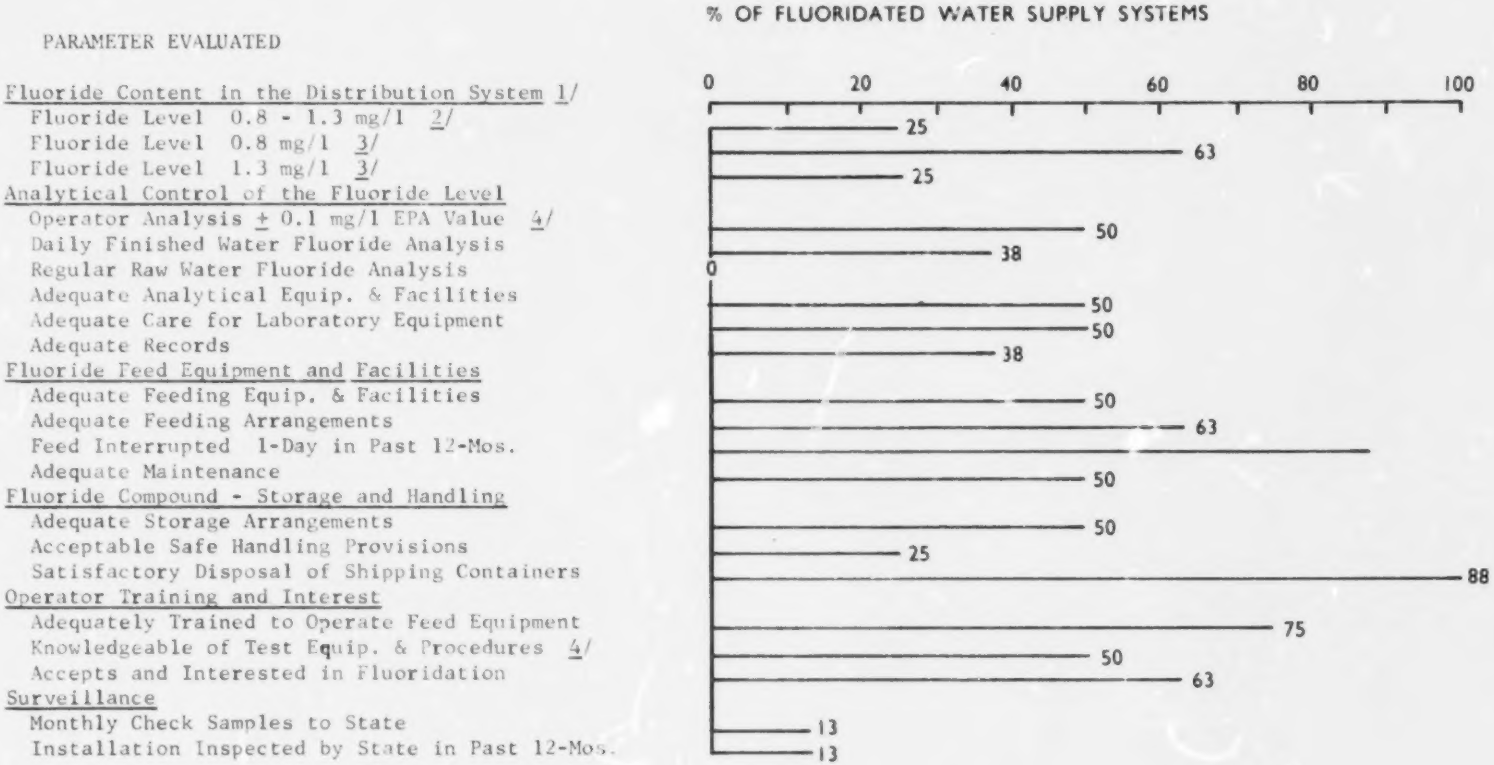
Frequent check samples of fluoride ion levels in the distribution system and regular inspection visits to the water fluoridation installation by state water supply program personnel must be conducted to assure the facility is operating satisfactorily. The Health Department's policy is for one water sample per month to be submitted from each fluoridated water supply to the State Health Department Laboratory for fluoride ion analysis. The sample is a 4-oz daily composite collected in one container, mixed and a 4-oz. sample drawn and mailed for check analysis. A review of state records, and discussions with the operators at the eight fluoridated water supply systems revealed just one (13 percent) of the operators was submitting the recommended monthly check sample to the state laboratory for fluoride ion analysis. Only one (13 percent) of the fluoridation installations had been visited in the past twelve months by a representative of the state water supply program surveillance agency. Inspection visits to the eight fluoridated water supply systems in Idaho averaged one visit in five years.

Figure 2, Operating Conditions At Fluoridated Water Supply Systems In Idaho, summarizes the operating conditions observed at the installations inspected during the time of the survey. Table III, Adequacy Of The Fluoridation Installations In Idaho, summarizes the adequacy of the operating conditions at each facility rated.

Conclusions and Recommendations

1. Eight public water supply systems in Idaho of a reported 280 public water supply systems in the State were fluoridating October 1, 1971. Thirty-four (34) supplies were known to use one or more sources containing natural fluorides of 0.7 mg/l or higher. Therefore only three percent of the 246 public water supply systems in Idaho not using one or more water sources containing natural fluorides of 0.7 mg/l or higher were attempting to supply water having a fluoride ion content within recommended limits.

Idaho Water Supply Program Evaluation
FIGURE 2
OPERATING CONDITIONS AT FLUORIDATED WATER SUPPLY SYSTEMS IN IDAHO



1/ Eight Installations Rated. Fluorides not being fed at Six Installations when Surveyed.
2/ Per 1962 Drinking Water Standards for an Annual Avg. Max. Daily Air Temp. of 63.1°F (Boise, Idaho 30-Yr. Avg. 1931-60)
3/ Distribution Samples from Preston were 0.8 and 1.3 mg/1.
4/ Six Installations Rated. Two Operators at Eight Installations Fluoridating did not Conduct Fluoride Ion Analysis.

Idaho Water Supply Program Evaluation
Table III
ADEQUACY OF THE FLUORIDATION INSTALLATIONS IN IDAHO

Parameter Evaluated	Bonners Ferry	Council	Jerome 1/	Lapwai 2/	Lewiston	McCall 5/	Meridan	Montpelier	Mountain Home 4/	Orifino	Preston	Salmon 5/	Sandpoint	Shoshone 6/
Fluoride Content in the Distribution System														
Fluoride Level 0.8 - 1.3 mg/1 7/					x								x	
Fluoride Level < 0.8 mg/1		x					x	x		x	x			
Fluoride Level > 1.3 mg/1	x										x			
Analytical Control of The Fluoride Level														
Operator Analysis ± 0.1 mg/1 EPA Value		8/			x					x	8/		x	
Daily Finished Water Fluoride Analysis	x				x								x	
Regular Raw Water Fluoride Analysis														
Adequate Analytical Equip. & Facilities	x				x					x			x	
Adequate Care For Laboratory Equipment		N/A			x					x	N/A		x	
Adequate Records	x						x						x	
Fluoride Feed Equipment and Facilities														
Adequate Feeding Equipment & Facilities	x									x	x		x	
Adequate Feeding Arrangements	x				x		x			x			x	
Feed Interrupted < 1-Day in Past 12-mos.	x	x			x		x	x			x		x	
Adequate Maintenance	x				x					x			x	
Fluoride Compound - Storage and handling														
Adequate Storage Arrangements	x									x	x		x	
Acceptable Safe handling Provisions	x				x									
Satisfactory Disposal of Shipping Containers	x	x			x		x	x		x	x		x	
Operator Training and Interest														
Adequately Trained to Operate Feed Equip.	x				x		x			x	x		x	
Knowledgeable of Test Equip. & Procedures		N/A			x					x	N/A		x	
Accepts and Interested in Fluoridation	x				x		x	x					x	
Surveillance														
Monthly Check Samples to State 9/	x													
Installation Inspected by State in past 12-mos. 9/					x									

X - Satisfactory or applicable for community surveyed
1/ - Fluoridation discontinued Oct 16, 1971 - Chlorinator repairs required
2/ - Fluoridation discontinued approx. June 25, 1971, (2 wks. after start-up)-Well pump failure and indifference
3/ - Fluoridation discontinued approx. Nov. 15, 1971 - Equipment repairs required
4/ - Fluoridation discontinuedApril, 1971 - Equipment dismantled
5/ - Fluoridation discontinued April 14, 1971 - Equipment repairs required and indifference
6/ - Fluoridation discontinued Sept. 11, 1971 - Chlorinator repairs required
7/ - Per 1962 Drinking Water Standards for an annual avg. max. daily air temp. of 63.1°F (Boise, Idaho; 30-yr. Avg. 1931-60)
8/ - No Fluoride Analysis conducted by operator
9/ - Per 1970 State Health Dept. records
N/A - Not Applicable

Recommendation:

The Idaho Department of Health should more actively promote and support fluoridation in Idaho. A concentrated effort should be made to provide the benefits of fluoridated water to the population served by the more than 235 small public water supplies in the State not fluoridated or containing dentally significant concentrations of natural fluorides. Where the fluoridation of a community water supply system is not feasible, school water supply fluoridation in that community should be considered.

2. Seven public water supply systems in Idaho were reported using one or more water sources containing natural fluorides greater than 2.0 mg/l.

Recommendation:

When the natural fluoride ion level exceeds two times the optimum, the following should be considered so the finished water will have a fluoride ion level within the limits recommended by the State: blending of water containing high levels of fluoride ion with a low natural fluoride water, development of an alternate source of water, or defluoridation of the water source.

3. Only two (25 percent) of the eight fluoridated water supply systems in Idaho evidenced a fluoride ion content in the distribution system within a range of 0.8 - 1.3 mg/l. Five (63 percent) were underfeeding and two (25 percent) were overfeeding. Water samples collected from one system were both above and below the recommended range. Three

(50 percent) of the operators at the six fluoridated supplies conducting fluoride ion analyses were within ± 0.1 mg/l of the sample results analyzed by the EPA Water Supply Programs Division. Two operators did not conduct fluoride ion analysis and had no test equipment. Daily finished water fluoride ion analysis was conducted by the operators at only three (38 percent) of the installations and no regular raw water fluoride ion analysis was conducted at any of eight facilities.

Recommendation:
The State of Idaho should provide the necessary training and technical assistance to the water plant operators at the fluoridation installations to control the fluoride ion level in the distribution system within the recommended range, and to conduct fluoride ion analysis according to Standard Methods to within ± 0.1 mg/l of the value reported on the State check sample. Daily finished water fluoride ion analysis, regular raw water fluoride ion analysis, adequate laboratory equipment and care of equipment, and complete records on the fluoridation operation should be required at all fluoridation installations.

4. Fluoride chemical feed equipment and facilities to control the distribution system fluoride ion level to within the recommended range were satisfactory at four (50 percent) of the installations surveyed and feeding arrangements were judged adequate at five (63 percent) of the plants visited. One (13 percent) of the

operators reported one or more interruptions in fluoridation of one or more days duration in the past twelve months and maintenance conditions were less than satisfactory at four (50 percent) of the facilities visited.

Recommendation:

The State of Idaho should provide design assistance to all communities proposing to install fluoridation facilities, thoroughly review all proposed installations before the operation is approved, and assist the operator as needed during the "start-up" period. All interruptions in the fluoridation operations should be required to be reported to the state water supply program surveillance agency. A preventative maintenance program should be established for each facility and closely followed for the installation to receive continued approval for operation.

5. Fluoride chemical storage arrangements and safety precautions for handling the compounds were judged inadequate at four (50 percent) of the installations surveyed. Six (75 percent) of the operators did not have available or were not using safety equipment in handling the fluoride chemical compounds.

Recommendation:

The State of Idaho should instruct all water plant operators feeding fluorides on safe handling and storage practices for fluoride chemical compounds. Safety regulations for the handling and storage of fluoride chemicals should be adopted and included in Part XII - Fluoridation of Public Water Supplies, of the State Drinking Water Standards.

6. A trained operator with a genuine interest in feeding fluorides is essential to the satisfactory operation of a fluoridation installation. Training deficiencies were noted in the operators' knowledge of his fluoride feed equipment and his acquaintance with the test equipment and procedures used in conducting fluoride ion analysis. The plant operators at two facilities were not trained to conduct fluoride ion analysis and three (38 percent) of the operators questioned did not favor feeding fluorides to public water supply systems.

Recommendation:

The State of Idaho should provide training in fluoride feed equipment operation and fluoride determinations in water for the operators of all fluoridated water supply systems. The benefits of water fluoridation and the importance of maintaining the fluoride ion level within the recommended range should be stressed. Satisfactory completion of the course should be a mandatory requirement of the plant operator for approval of his installation to feed fluorides. The operators at all fluoridation facilities should conduct daily fluoride ion analysis.

7. Surveillance of each water fluoridation installation must be on a regular, continual basis to assure the facility is operating satisfactory. Only one (13 percent) of the operators interviewed was submitting the recommended monthly check sample to the state laboratory for fluoride ion analysis. Inspection visits to the

fluoridated water supply systems in Idaho by a representative of the state water supply program surveillance agency averaged one visit in five years.

Recommendation:

The State of Idaho should require at least monthly check samples be submitted by the operators of all fluoridated water supply systems to the State Laboratory for fluoride ion analysis. These should be grab samples in preference to composite samples. The state water supply program surveillance agency should conduct a minimum of two field inspection visits per year to each water fluoridation installation in the state and visit immediately all plants employing new operating personnel placed in charge of the fluoridation operation. All interruptions in the fluoridation operations should be investigated. A full time engineer with the necessary travel funds and laboratory support is estimated to be needed for an adequate fluoridation surveillance program in Idaho.

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DATE: ____________

IDAHO FLUORIDATION SURVEY

Water System:

Population Served: Average Flow:

Date Fluoridation Started:

Source of Supply:

Treatment:

Fluoride Analysis:
Raw Water: Finished Water:

Fluoridation Equipment -

Manufacturer:

Type:

Model:

Location:

Point of application:

Condition of equipment:

Operational problems:

Overfeeding safeguards:

Planned Improvements:

Remarks:

Fluoride Compound -

Chemical: Cost:

Source:

Form of shipment

Storage facilities:

Quantity used:

Safety provisions:

Remarks:

Control of Fluoridation -

Frequency of sampling:
Raw water: Finished water:

Sampling point:

Test method:

Test instrument:

Records:

Interruptions:

Remarks:

Operator Qualifications -

Experience: Classification:

Training:

Interest:

Remarks:

Surveillance -

Check samples:

Last visit by State:

Availability of technical assistance:

Remarks:

Comments -

APPENDIX C

BACTERIOLOGICAL LABORATORY SURVEY

Report of a Survey of the
Idaho Department of Health
Central Water Laboratory
2150 Warm Springs Avenue
Boise, Idaho 83701
on November 29-30, 1971

by

Harry D. Nash, Ph. D.
Microbiologist
Environmental Protection Agency
4676 Columbia Parkway
Cincinnati, Ohio 45268

The equipment and procedures employed in the bacteriological analyses of water by this laboratory conformed with the provisions of Standard Methods for the Examination of Water and Wastewater (13th edition - 1971) and with the provisions of the Interstate Quarantine Drinking Water Standards, except for items marked with a cross "X" on the accompanying form EPA - 103 (Rev 3-71). Items marked with a "U" could not be determined at the time of the survey. Items marked "O" do not apply to the procedures programmed in the laboratory. Specific deviations are described with appropriate remedial action for compliance in the following recommendations:

Recommendations

Item 3 Sample bottles

Samples taken in narrow-mouth bottles are more subject to accidental contamination, especially if the person collecting the sample is inexperienced. Therefore, it is recommended that wide-mouth bottles be phased into service as part of the normal replacement of broken and lost bottles.

Items 2, 4 Collection procedures and transportation and storage

When two or more samples are shipped in the same container, each sample must be marked to correspond with the appropriate sample sheet. Each sample sheet should contain complete information relating to the sample, including the date of collection and the exact location sampled. It is also suggested that a space be provided to enter residual chlorine values.

It is recommended that the instructions on the back of the State of Idaho Dept. of Health form DH 61271, figure 1, relating to the volume of sample to be collected, be changed. Presently the sample collector is instructed to fill the sample bottle two-thirds (2/3) full. Since the capacity of the sample bottle is 120 ml, the volume received for analysis would only be 80 ml and the minimum recommended sample volume is 100 ml. The present sample bottle could be marked to assure that a minimum of 100 ml is collected with ample space remaining for adequate shaking. Then samplers could be instructed to fill the bottle to this mark. It is also recommended that the last sentence in item 4 on the back of the State of Idaho Department of Health form DH 61058, figure 1, "If samples must be held for some time they should be refrigerated," be deleted. All samples should reach the laboratory within 30 to 48 hours after collection. Therefore, it is suggested that sample collectors be instructed to coordinate sample collection and shipment with existing mailing and shipping schedules in their area.

Item 5 Record of Laboratory Examinations

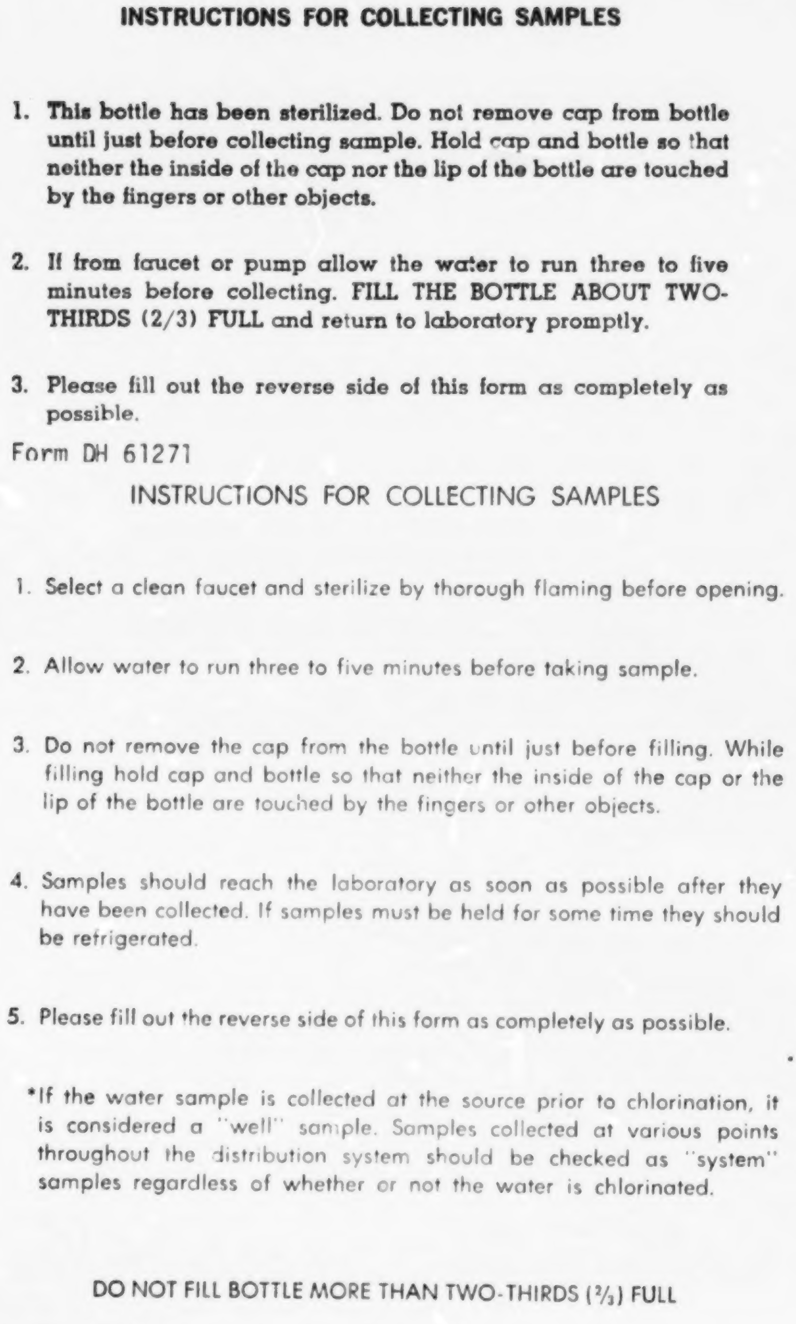
The procedure for reporting results of bacteriological analyses depends upon the type system examined. Results of samples from municipal supplies are reported directly to the purveyor with copies of the report sent to the Environmental Improvement Division (EID). It is the responsibility of EID to initiate a program for remedial action when unsatisfactory samples are reported. However, results relating to private and semi-public supplies are reported differently. These results are sent to the purveyor or owner and a copy sent to the District Health Department. If the sample is unsatisfactory, a form letter similar to Exhibit A, is sent along with the report. The EID is not contacted.

A semi-public supply is defined as: (1) new subdivisions not yet included in municipal supplies, (2) schools, and (3) industries.

Basically there is no resampling program for remedial action when unsatisfactory samples are obtained, table 1. Regulations do recommend that unsatisfactory samples should be reported and a program be initiated which provides for daily samples to be collected from the same sampling point and examined until the results obtained from at least two consecutive samples indicate that contamination is no longer present. Such regulations are outlined in the Public Health Service Drinking Water Standards, 1962, and the Surgeon General's memorandum to all State Health Officers, dated February 15, 1963.

Items 7, 9 Incubators

A daily record of incubator temperatures is required in the absence of a recording thermometer. This record should include the date, temperature and initials of the person who records the data. Any deviation greater than the variance permitted should be corrected by proper thermostat adjustment. Maintaining such a record will also alert laboratory personnel to any gradual changes which may reflect possible metal fatigue in the bi-metallic strip of the thermostat.



INSTRUCTIONS FOR COLLECTING SAMPLES

1. This bottle has been sterilized. Do not remove cap from bottle until just before collecting sample. Hold cap and bottle so that neither the inside of the cap nor the lip of the bottle are touched by the fingers or other objects.
2. If from faucet or pump allow the water to run three to five minutes before collecting. FILL THE BOTTLE ABOUT TWO-THIRDS (2/3) FULL and return to laboratory promptly.
3. Please fill out the reverse side of this form as completely as possible.

Form DH 61271

INSTRUCTIONS FOR COLLECTING SAMPLES

1. Select a clean faucet and sterilize by thorough flaming before opening.
2. Allow water to run three to five minutes before taking sample.
3. Do not remove the cap from the bottle until just before filling. While filling hold cap and bottle so that neither the inside of the cap or the lip of the bottle are touched by the fingers or other objects.
4. Samples should reach the laboratory as soon as possible after they have been collected. If samples must be held for some time they should be refrigerated.
5. Please fill out the reverse side of this form as completely as possible.

*If the water sample is collected at the source prior to chlorination, it is considered a "well" sample. Samples collected at various points throughout the distribution system should be checked as "system" samples regardless of whether or not the water is chlorinated.

DO NOT FILL BOTTLE MORE THAN TWO-THIRDS (⅔) FULL

Form DH 61058

Figure 1
Instructions for collecting samples from municipal (DH 61058) and private and semi-public (DH 61271) water supplies

EXHIBIT A

CITY COUNTY HEALTH DEPT.
1455 North Orchard
BOISE, IDAHO 83704

Boise, Idaho CITY-COUNTY HEALTH DEPARTMENT Telephone 375-5211

CONTAMINATED DRINKING WATER

Laboratory examination of your water sample indicates that the water is contaminated with intestinal type of bacteria. This indicates that the water is polluted by organisms normally found in sewage and continued use may result in disease.

Corrective measures can be divided into two categories. The first is aimed at preventing surface water or other contaminating material from gaining access to the well, and the second is aimed at disinfecting the well.

OLD WELLS: These wells may be contaminated because of poor construction or because the source of water itself is contaminated. If the latter is the case, (usually shallow wells) little can be done to improve the situation except to have a well driller seal (case) off this shallow contaminated water and seek safe water at a greater depth. Dug wells commonly show contamination because it is almost impossible to keep out surface or seepage waters.

NEW WELLS: It has been our experience that new wells or recently repaired old wells and water systems commonly show contamination. This is because the materials used are ordinarily contaminated. Disinfection, as outlined below, will usually correct this trouble.

DISINFECTING WELLS

Wells may be disinfected by adding chlorine solutions, (Clorox, White Magic, Purex, etc.) or chlorine powders (H.T., B.K., Chloride of Lime, etc.) directly to the water in the well. About a quart of solution or 1/4 lb. of powder should be added to a 4-inch well but proportionately more is required for larger wells. Larger quantities may be required where unusual conditions are encountered. Add this material directly to the well itself in the evening and operate the pump until chlorine can be detected at all taps, then allow to set all night. Pump out the well thoroughly the following morning until no smell or taste of chlorine is left and sample again (for laboratory examination) on the following day. Sample bottles supplied by the Department of Health, Laboratory Services, should be used for this purpose. Periodic sampling should be done to be reasonably certain that the difficulty has been corrected.

ADA COUNTY HEALTH OFFICER

EXHIBIT A

When it is suspected that the water is contaminated because of poor design or construction there are a number of conditions to check.

1. Is the well deep enough to get satisfactory water? Water from shallow wells and pitcher pumps is always subject to contamination.
2. Is the well tightly cased? Make certain the casing is not perforated or cracked and that the joints are tight in the contaminated area or upper strata.
3. Is the well or casing tightly sealed at the top? This is important to keep out surface contamination and rodents.
4. Is the top of the well in a pit? This is a poor situation unless special protection is offered.
5. Is the surface drainage toward the well and are irrigation waters close? If so, these conditions should be remedied.
6. Are outdoor toilets, septic tanks, cesspools or sewer lines close to the well? If so, this is a definite hazard.
7. Is your well in lava formation where crevices may carry contamination great distances?
8. Are there other conditions which could contribute to the contamination of the water?

If you are still in doubt concerning the safety of your well or the quality of your water, write or call the City-County Health Department. We shall be glad to advise you or perhaps a sanitarian can call on you. After all, remember that a safe water supply is one of the foundations of good family and community health.

Table 1

Resampling Intervals on Reported Positive Samples
January - October 1971

Name of Municipal Water Supply	Date			Approx. time interval for resample
	Collected	Reported*	Resampled	
Bliss	5/10	5/13	6/9	27
Boise (Boise Water Corp)	1/27	1/30	2/3 - 2/12	4
	5/5	5/8	5/12 - 6/1	4
	6/9	6/12	6/16 - 6/23	4
	9/27	9/30	10/4 - 10/6	4
Boise (Eugene Outlook)	8/27	8/30	9/28	29
Boise (Lucky Lane)	2/11	2/14	2/19 - 3/18	5
Boise (Malad Hilton)	5/29	6/1	6/9 - 7/12	8
	8/11	8/14	9/22	39
Caldwell	1/25	1/28	4/12	74
Emmett (Municipal)	5/11	5/14	5/24	10
Haggerman	4/8	4/11	10/18	158
	8/26	8/29	9/11	13
Idaho City	9/2	9/5	9/15	10
Marsing	4/5	4/8	5/25 - 7/20	47
Mt. Home	8/2	8/5	none	not resampled
	10/18	10/21	none	not resampled

*The time interval between sample collection and reporting averaged three days.

Item 12 Thermometers

The accuracy of all thermometers should be verified at selected temperatures within the minimum and maximum range of intended use by comparison with a thermometer certified by the National Bureau of Standards or one of equivalent accuracy. One certified thermometer would be sufficient if it were available to all regional laboratories.

Item 32 Buffered Dilution Water

A fresh stock buffer solution should be prepared if the turbidity indicates biological growth in the stock solution. Microorganisms are capable of survival and growth in buffered dilution water which could adversely influence the effectiveness of the buffer solution. Rather than storing the entire supply of stock buffer in one container, it is suggested that 25-30 ml portions be dispensed in screw-cap test tubes, autoclaved for 15 minutes at 121°C and stored at 5 - 10° C. Having several smaller volumes available will eliminate accidental contamination of the entire supply.

Item 33 pH Measurements

A record of the pH, medium lot number, and date of preparation should be maintained on each batch of culture medium prepared. The minimal requirement is to maintain such a record for each new bottle of medium used. By monitoring final medium pH, a check can be made on possible errors in weighing, excessive heating or sterilization which could cause lactose hydrolysis, chemical contamination, or deterioration of ingredients that might occur during storage of the dehydrated medium.

Item 34 Sterilization of media

It is suggested that liquid media containing carbohydrates be sterilized at 121°C for 12 minutes. This will reduce the chance of lactose hydrolysis resulting from excessive exposure of lactose to heat. Such hydrolysis produces glucose and galactose which can be fermented by non-coliform organisms resulting in false-positive reactions.

Item 48 Completed test

The confirmed test can yield positive reactions in the absence of the coliform group (false-positive test). Therefore, it is necessary to establish the validity of the confirmed test by comparison with the completed test. The number of comparative procedures depends on the individual location and waters being examined. Approximately 20 comparative procedures each three months should be sufficient when there is good agreement. The number should be increased if results from the confirmed and completed tests differ. The completed test is the reference standard.

Item 50 MF Procedure

The present practice of applying continuous vacuum during the entire membrane filter procedure is not recommended. In order to avoid uneven distribution of organisms over the membrane and accidental breaking of the filter, vacuum should be applied only during the actual filtration process.

Air bubbles between the membrane and agar can easily be recognized on m-Endo (MF) agar medium as colorless (white) spots in the membrane. A membrane properly placed is uniformly pink. To eliminate bubbles, lift the membrane with sterile forceps and re-roll it onto the agar surface. Desiccation and death of coliform organisms may occur where air bubbles are formed which could result in a lower count than is actually present in the volume of sample filtered.

Laboratory Evaluation Program

Mr. Owen Carpenter, Assistant Director of Laboratories, is designated as the State Water Laboratory Survey Officer. He is knowledgeable in the field of water bacteriology, familiar with coliform detection methods, laboratory apparatus, media requirements and analysis of laboratory records for compliance of sampling to meet requirements in water quality standards.

Idaho has seven public health districts, Exhibit B, with the central laboratory in Boise serving two districts and five regional laboratories serving the remaining five, table 2. These laboratories are the only ones examining potable water supplies in the state.

Table 2

Regional Laboratories Certified to Examine Drinking Water

Laboratory and Location	District Served	Date Certified	Surveying Officer
Coeur d'Alene	1	8/29/69	O. Carpenter
Lewiston IC*	2	8/28/69	O. Carpenter
Twin Falls	5	12/10/69	O. Carpenter
Pocatello	6	11/19/69	O. Carpenter
Idaho Falls IC	7	10/12/69	O. Carpenter

*Laboratories examing water supplies serving Interstate Carriers.

Remarks

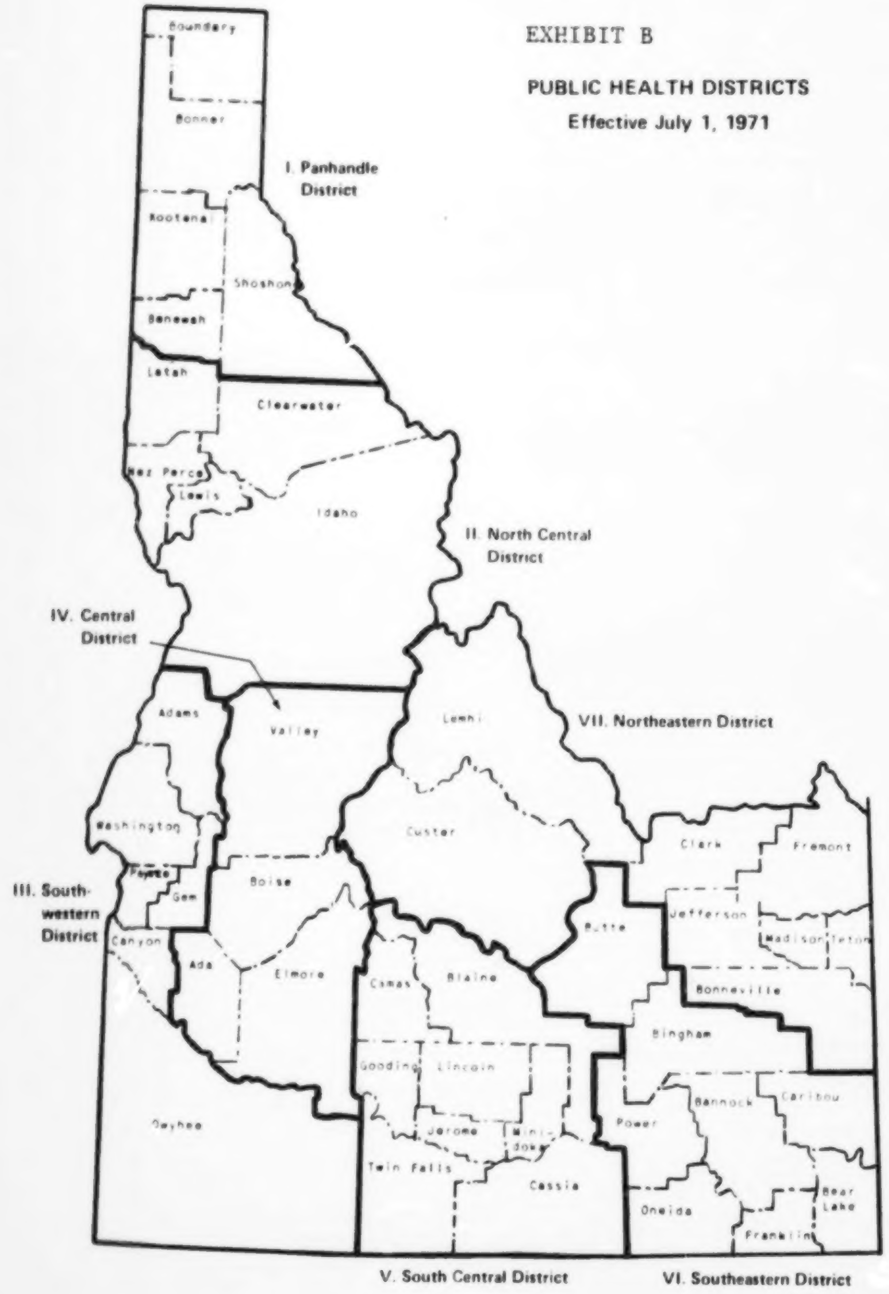
At present the Boise Laboratory is using both Gelman (Metricel) and Millipore membrane filters. Both have currently been evaluated and are rated as being of comparable quality. However, it is recommended that a surveillance of the quality of both be conducted during routine use. Such a surveillance should include:

1. Increase or decrease of filtration time
2. Increase of filtration through individual portions of the membrane
3. Toxicity of the ink used to print grid markings
4. Diffusion of ink when membranes are incubated, especially when used in the membrane filter fecal coliform procedure.

EXHIBIT B

PUBLIC HEALTH DISTRICTS

Effective July 1, 1971


Boundary
Bonner
I. Panhandle District
Kootenai
Shoshone
Benewah
Latah
Clearwater
Nez Perce
Lewis
Idaho
II. North Central District
IV. Central District
Adams
Valley
Lemhi
VII. Northeastern District
Washington
Custer
Clark
Fremont
Payette
Gem
Boise
III. South-western District
Canyon
Butte
Jefferson
Madison
Teton
Ada
Elmore
Camas
Blaine
Bonneville
Bingham
Gooding
Lincoln
Bannock
Caribou
Power
Jerome
Mini-doka
Twin Falls
Cassia
Owyhee
Bear Lake
Oneida
Franklin
V. South Central District
VI. Southeastern District

Specific deviations observed at the Idaho Falls and Lewiston Regional Laboratories can not be corrected at the regional level and the major responsibility for corrective action must be initiated at the State level. This is recommended since all purchasing authority is at the State level and the Regional Laboratories are entirely dependent upon the State Health Department for their needs and procedural guidelines.

Table 3 lists the item number and short description of each deviation. Reference should be made to the individual survey report on each regional laboratory for specific information relating to the deviation and corrective recommendation.

Table 3

Deviations at Regional Level Requiring State Action

Regional Laboratory	Item Number	Brief description of deviation
Idaho Falls	2 and 4	Laboratory forms accompanying sample
	3	Sample bottles
	5	Reporting results and remedial action
	9	Water bath incubator
	12	Thermometers
	60	Physical facilities
	61	Laboratory safety, autoclave
Lewiston	2 and 4	Laboratory forms accompanying samples
	3	Sample bottles
	5	Reporting results and remedial action
	12	Thermometers
	13	pH meter

Personnel Approved

Mrs. Connie Roberts, Microbiologist, is approved for the application of the multiple tube fermentation and membrane filter procedures for the bacteriological examination of drinking water for total coliform and the application of the multiple tube fermentation procedure used in stream quality measurements for total and fecal coliform.

Conclusions

The procedures and equipment in use at the time of the survey complied in general with the provisions of Standard Methods for the Examination of Water and Wastewater (13th edition - 1971) and the Interstate Quarantine Drinking Water Standards, and with correction of deviations listed, it is recommended that the results be accepted for the bacterial examination of waters under interstate regulations.

Harry D. Nash

Harry D. Nash

Report of a Survey of the
Idaho Department of Health
Idaho Falls Regional Laboratory
520 Legion Drive
P.O. Box 661
Idaho Falls, Idaho 83401
December 1, 1971

by

Harry D. Nash, Ph. D.
Microbiologist
Environmental Protection Agency
4676 Columbia Parkway
Cincinnati, Ohio 45268

The equipment and procedures employed in the bacteriological analyses of water by this laboratory conformed in general with the provisions of Standard Methods for the Examination of Water and Wastewater (13th edition - 1971) and with the provisions of the Interstate Quarantine Drinking Water Standards, except for items marked with a cross "X" on the accompanying Form EPA - 103 (Rev 3-71). Items marked with a "U" could not be determined at the time of the survey. Items marked "O" do not apply to the procedures programmed in the laboratory. Specific deviations are described with appropriate remedial action for compliance in the following recommendations:

Recommendations

Item 3 Sample bottles

Samples taken in narrow-mouth bottles are more subject to accidental contamination, especially if the person collecting the sample is inexperienced. Therefore, it is recommended that wide-mouth bottles be phased into service as part of the normal replacement of broken and lost bottles.

Item 2, 4 Collection procedures and transportation and storage

When two or more samples are shipped in the same container, each sample must be marked to correspond with the appropriate sample sheet. Each sample sheet should contain complete information relating to the sample, including the date of collection and the exact location sampled. It is also suggested that a space be provided to enter residual chlorine values.

Instructions to sample collectors

It is recommended that the instructions on the back of the State of Idaho Department of Health form DH 61271, figure 1, relating to the volume of sample to be collected, be changed. Presently the sample collector is instructed to fill the sample bottle two-thirds (2/3) full. Since the capacity of the sample bottle is 120 ml, the volume received for analysis would only be 80 ml and the minimum recommended sample volume is 100 ml. The present sample bottle could be marked to assure that a minimum of 100 ml is collected with ample space remaining for adequate shaking. Then samplers could be instructed to fill the bottle to this mark. It is also recommended that the last sentence in item 4 on the back of the State of Idaho Department of Health form DH 61058, figure 1, "If sample must be held for some time they should be refrigerated," be deleted. All samples should reach the laboratory within 30 to 48 hours after collection. Therefore, it is suggested that sample collector be instructed to coordinate sample collection and shipment with existing mailing and shipping schedules in their area.

Item 5 Record of laboratory examination

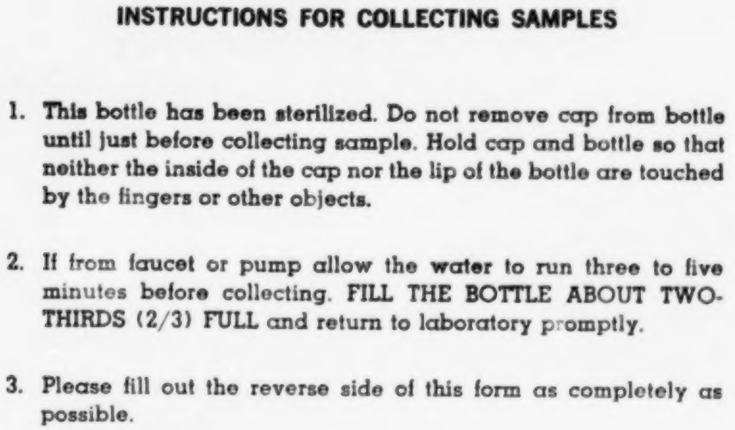
The procedure for reporting results of bacteriological analyses depends upon the type supply examined. All results are reported by mail unless a special request is made for telephonic notification. All results concerning municipal supplies are reported to the municipality and to the State Regional Engineer. A report is not sent directly to the Environmental Improvement Division in Boise. Results concerning private and semi-public supplies are sent to the purveyor or owner and to the County Environmentalist. The State Regional Engineer is not notified by the laboratory. If samples from private or semi-public supplies are unsatisfactory, a form letter, similar to Exhibit A, accompanies the report.

A semi-public supply is defined as one serving: (1) new subdivisions not yet included in municipal supplies, (2) schools, and (3) industries.

Basically there is no resampling program for remedial action when unsatisfactory samples are reported, Table 1. Regulations do recommend that unsatisfactory samples be reported and a program be initiated which provides for daily samples to be collected from the same sampling point and examined until the results obtained from at least two consecutive samples indicate that contamination is no longer present. Such regulations are outlined in the Public Health Drinking Water Standards, 1962, and the Surgeon General's memorandum to all State Health Officers, dated February 15, 1963.

Item 9 Water bath incubator

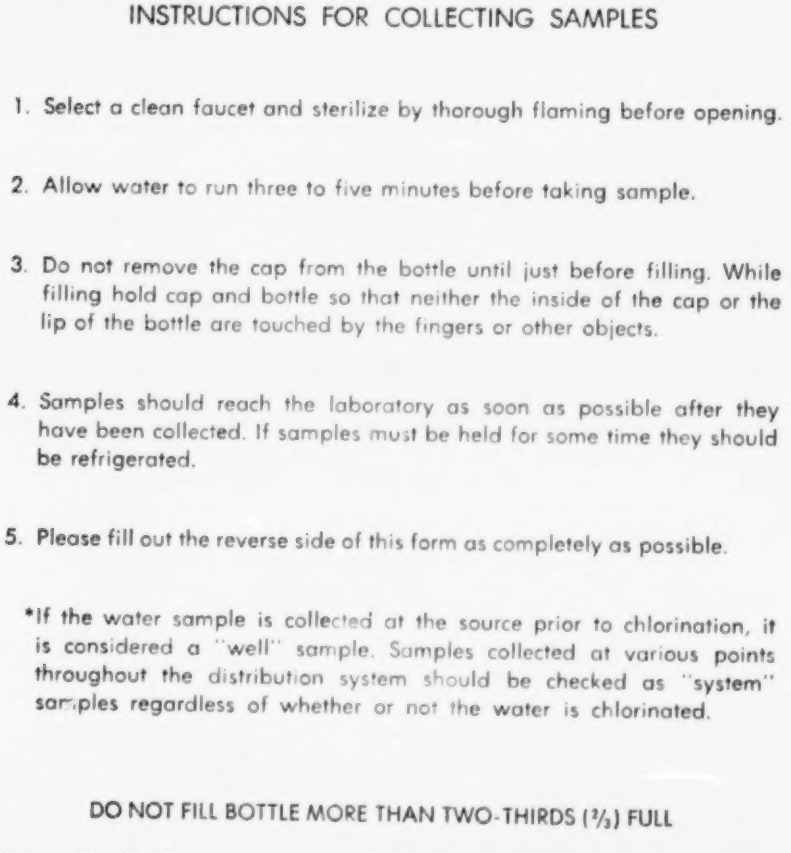
The model water bath which is used for fecal coliform incubation is not adequate. The design is such that a uniform temperature of 44.5 ± 0.2°C cannot be maintained. In addition, the same water bath is used for certain clinical diagnostic examinations which require changing the temperature controls from



INSTRUCTIONS FOR COLLECTING SAMPLES

1. **This bottle has been sterilized. Do not remove cap from bottle until just before collecting sample. Hold cap and bottle so that neither the inside of the cap nor the lip of the bottle are touched by the fingers or other objects.**
2. **If from faucet or pump allow the water to run three to five minutes before collecting. FILL THE BOTTLE ABOUT TWO-THIRDS (2/3) FULL and return to laboratory promptly.**
3. **Please fill out the reverse side of this form as completely as possible.**

Form DH 61271



INSTRUCTIONS FOR COLLECTING SAMPLES

1. Select a clean faucet and sterilize by thorough flaming before opening.
2. Allow water to run three to five minutes before taking sample.
3. Do not remove the cap from the bottle until just before filling. While filling hold cap and bottle so that neither the inside of the cap or the lip of the bottle are touched by the fingers or other objects.
4. Samples should reach the laboratory as soon as possible after they have been collected. If samples must be held for some time they should be refrigerated.
5. Please fill out the reverse side of this form as completely as possible.

*If the water sample is collected at the source prior to chlorination, it is considered a "well" sample. Samples collected at various points throughout the distribution system should be checked as "system" samples regardless of whether or not the water is chlorinated.

DO NOT FILL BOTTLE MORE THAN TWO-THIRDS (⅔) FULL

Form DH 61058 Figure 1

Instructions for collecting samples from municipal (DH 61058) and private and semi-public (DH 61271) water supplies

EXHIBIT A

CITY COUNTY HEALTH DEPT.
1455 North Orchard
BOISE, IDAHO 83704

Boise, Idaho CITY-COUNTY HEALTH DEPARTMENT Telephone 375-5211

CONTAMINATED DRINKING WATER

Laboratory examination of your water sample indicates that the water is contaminated with intestinal type of bacteria. This indicates that the water is polluted by organisms normally found in sewage and continued use may result in disease.

Corrective measures can be divided into two categories. The first is aimed at preventing surface water or other contaminating material from gaining access to the well, and the second is aimed at disinfecting the well.

OLD WELLS: These wells may be contaminated because of poor construction or because the source of water itself is contaminated. If the latter is the case, (usually shallow wells) little can be done to improve the situation except to have a well driller seal (case) off this shallow contaminated water and seek safe water at a greater depth. Dug wells commonly show contamination because it is almost impossible to keep out surface or seepage waters.

NEW WELLS: It has been our experience that new wells or recently repaired old wells and water systems commonly show contamination. This is because the materials used are ordinarily contaminated. Disinfection, as outlined below, will usually correct this trouble.

DISINFECTING WELLS

Wells may be disinfected by adding chlorine solutions, (Clorox, White Magic, Purex, etc.) or chlorine powders (H.T., B.K., Chloride of Lime, etc.) directly to the water in the well. About a quart of solution or 1/4 lb. of powder should be added to a 4-inch well but proportionately more is required for larger wells. Larger quantities may be required where unusual conditions are encountered. Add this material directly to the well itself in the evening and operate the pump until chlorine can be detected at all taps, then allow to set all night. Pump out the well thoroughly the following morning until no smell or taste of chlorine is left and sample again (for laboratory examination) on the following day. Sample bottles supplied by the Department of Health, Laboratory Services, should be used for this purpose. Periodic sampling should be done to be reasonably certain that the difficulty has been corrected.

ADA COUNTY HEALTH OFFICER

EXHIBIT A

When it is suspected that the water is contaminated because of poor design or construction there are a number of conditions to check.

1. Is the well deep enough to get satisfactory water? Water from shallow wells and pitcher pumps is always subject to contamination.

2. Is the well tightly cased? Make certain the casing is not perforated or cracked and that the joints are tight in the contaminated area or upper strata.

3. Is the well or casing tightly sealed at the top? This is important to keep out surface contamination and rodents.

4. Is the top of the well in a pit? This is a poor situation unless special protection is offered.

5. Is the surface drainage toward the well and are irrigation waters close? If so, these conditions should be remedied.

6. Are outdoor toilets, septic tanks, cesspools or sewer lines close to the well? If so, this is a definite hazard.

7. Is your well in lava formation where crevices may carry contamination great distances?

8. Are there other conditions which could contribute to the contamination of the water?

If you are still in doubt concerning the safety of your well or the quality of your water, write or call the City-County Health Department. We shall be glad to advise you or perhaps a sanitarian can call on you. After all, remember that a safe water supply is one of the foundations of good family and community health.

Table 1

Resampling intervals on reported positive samples
January - October 1971

Name of municipal water supply	Date Collected	Date Reported	Date Resampled	Time Interval for Resampling
Ashton	2/17/71	2/20/71	3/2/71	10 days
	5/26/71	5/30/71	none	
Iona	10/1/71	10/8/71	none	
Newdale	4/12/71	4/17/71	8/20/71	over 4 months
	5/17/71	5/22/71	7/20/71	approx. 2 mos.
Ucon	7/12/71	7/15/71	7/20/71	5 days
	7/12/71	7/15/71	7/16/71	1 day
	7/16/71	7/19/71	7/20/71	1 day

one setting to another depending on the test. Such constant changing of the controls is not desirable because of the uncertainty of temperature stabilization. It is recommended that a water bath equipped with a gabled cover to reduce water and heat loss be purchased for incubating fecalcoliform cultures. A daily record should be maintained to assure proper incubation temperature is achieved.

Item 10 Hot air sterilization oven

The commercial type oven used to sterilize dry glassware should be checked in order to verify that sterilization temperature is reached and maintained (170° - 180°C for two hours). This can be done by placing a thermometer in a can filled with fine sand and placed in the oven so that the thermometer can be read immediately after the oven door is opened. The sand will prevent an immediate thermometer fluctuation and permit adequate verification of the maximum temperature obtained.

Item 12 Thermometers

The accuracy of all thermometers should be verified at temperatures within the minimum and maximum range of intended use by comparison with one certified by the National Bureau of Standards or one of equivalent accuracy. It is suggested that this service or such a thermometer be requested from the central laboratory in Boise.

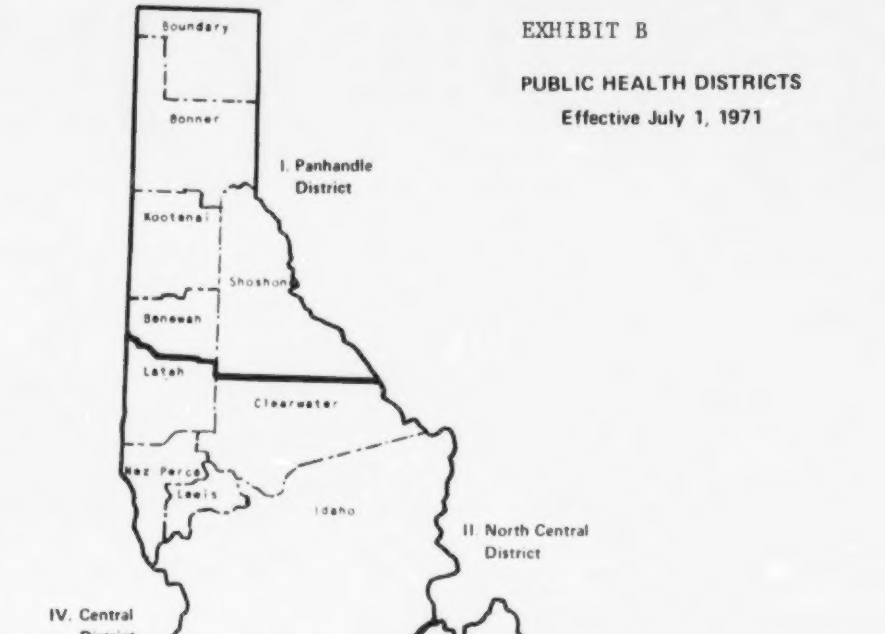
Item 31 Laboratory water quality

Distilled water used for bacteriological tests should be free of inorganic and organic substances either toxic or nutritive which may influence the survival

EXHIBIT B

PUBLIC HEALTH DISTRICTS

Effective July 1, 1971


Boundary
Bonner
I. Panhandle District
Kootenai
Shoshone
Benewah
Latah
Clearwater
Nez Perce
Lewis
Idaho
II. North Central District
IV. Central District
Adams
Valley
Lemhi
VII. Northeastern District
Washington
Custer
Clark
Fremont
Payette
Gem
Boise
III. South-western District
Canyon
Jefferson
Madison
Teton
Butte
Ada
Elmore
Camas
Blaine
Bonneville
Bingham
Gooding
Lincoln
Bannock
Caribou
Power
Jerome
Mini-doka
Owyhee
Twin Falls
Cassia
Bear Lake
Oneida
Franklin
V. South Central District
VI. Southeastern District

or growth of microorganisms. Several factors can influence the quality: (1) design of the distillation equipment, (2) source of water, (3) storage chamber for reserve supply, (4) temperature of stored supply, (5) duration of storage before use. These factors may contribute varying degrees of contaminants such as metal ions, ammonium hydroxide, hydrochloric acid, chlorine from the source water, and carbon dioxide from the air. In order to assure the quality, it is recommended that a distilled water suitability test be conducted at least once a year. This procedure for monitoring distilled water quality can also be done by the Central Lab as a service to the regional laboratory system.

Item 32 Buffered dilution water

A fresh stock buffer solution should be prepared if the turbidity indicates biological growth in the stock solution. Microorganisms are capable of survival and growth in buffered dilution water which could adversely influence its effectiveness. Rather than storing the entire supply of stock buffer in one container, it is suggested that 25-30 ml protions be dispensed in screw-cap test tubes, autoclaved for 15 minutes at 121°C and stored at 5 - 10°C. Having several smaller volumes available will eliminate accidental contamination of the entire supply.

Item 33 pH measurements

A record of the pH, medium lot number, and date of preparation should be maintained on each batch of culture medium prepared. The minimal requirement is to maintain such a record for each new bottle of medium used. By monitoring final medium pH, a check can be made on possible errors in weighing, excessive heating or sterilization which could cause lactose hydrolysis, chemical contamination, or deterioration of ingredients that might occur during storage of the dehydrated medium.

Item 34 Sterilization of media

It is suggested that liquid media containing carbohydrates be sterilized at 121°C for 12 minutes. This will reduce the chance of lactose hydrolysis resulting from excessive exposure of lactose to heat. Such hydrolysis produces glucose and galactose which can be fermented by non-coliform organisms resulting in false-positive reactions.

Item 50 MF procedure

It is recommended that sterile buffered water be used to rinse the funnel after filtering the sample. The pH of sterile distilled water may have an adverse effect, especially on attenuated organisms, if the pH of the distilled water indicates it to be too acid or basic.

Item 52 Counting - verification of coliform colonies

Verification of coliform or suspected coliform colonies should be conducted by picking colonies and inoculating either lactose or lauryl tryptose broth and then transferring positive cultures to brilliant green lactose bile (BGB) broth. The present practice of picking colonies and inoculating directly into BGB broth should be discontinued. Atypical colonies may be developing from attenuated coliform organisms and as a result the typical sheen will not be observed. Therefore, an enrichment procedure, inoculation into either lactose or lauryl tryptose broth, is required.

Item 60 Physical facilities

Mr. Dennis Paananen should be commended for his ability to conduct the number and variety of examinations in a laboratory having such limited space. It would be beneficial for the overall mission of this laboratory to provide new quarters or increase the facilities at the present location. Mr. Owen Carpenter also indicated the need for additional space in his laboratory evaluation report dated October 7, 1969. This laboratory conducts clinical diagnostic and water bacteriological examinations. The amount of space available for bench work, storage of both sterile and non-sterile media and equipment, and office facilities is insufficient. Such limited facilities could influence the quality of work and reliability of date unless corrected in the near future.

Item 61 Laboratory safety

It is recommended that periodic inspection and maintenance be conducted on the present autoclave. It appears that the drain becomes clogged periodically and at present there is no screen in the drain to retain material which causes blockage. Although this autoclave appears to function adequately, it is relatively old and replacement parts may be difficult to obtain. It is suggested that a new autoclave be purchased in the event that the present one can not be properly serviced and maintained.

Remarks

It is suggested that the Boise Central Water Laboratory assume the major responsibility for correction of deviations listed in items 2, 3, 4, 5, 9, 12, 60, and 61 because all purchasing authority is at the State level and the Regional Laboratories are entirely dependent upon the State Health Department for their needs and procedural guidelines.

Personnel Approved

Mr. Dennis Paananen, Microbiologist, is approved for the application of the multiple tube fermentation and membrane filter procedures for the bacteriological examination of drinking water for total coliform and the application of the multiple tube fermentation procedure used in stream quality measurements for total and fecal coliforms. Although Mr. Paananen is approved for the application of the multiple tube fermentation procedure used to detect fecal coliform, the data obtained using the present water bath incubator may be considered questionable if needed as official data.

Conclusions

The procedures and equipment in use at the time of the survey complied in general with the provisions of Standard Methods for the Examination of Water and Wastewater (13th edition - 1971) and the Interstate Quarantine Drinking Water Standards, and with correction of deviations listed, it is recommended that the results be accepted for the bacterial examination of waters under interstate regulations.

Harry D Nash
Harry D. Nash

REPORT OF A SURVEY OF THE
IDAHO DEPARTMENT OF HEALTH
LEWISTON REGIONAL LABORATORY
1221 F STREET
LEWISTON, IDAHO 83501
on December 2, 1971

by

Harry D. Nash, PhD., Microbiologist
Water Supply Programs Division
Environmental Protection Agency
4676 Columbia Parkway
Cincinnati, Ohio 45268

The equipment and procedures employed in the bacteriological analyses of water by this laboratory conformed in general with the provisions of Standard Methods for the Examination of Water and Wastewater (13 edition - 1971) and with the provisions of the Interstate Quarantine Drinking Water Standards, except for items marked with a cross "X" on the accompanying form EPA 103 (Rev 3-71). Items marked with a "U" could not be determined at the time of the survey. Items marked "O" do not apply to the procedures programmed in the laboratory. Specific deviations are described with appropriate remedial action for compliance in the following recommendations:

RECOMMENDATIONS

Item 3 Sample Bottle

Samples taken in narrow-mouth bottles are more subject to accidental contamination, especially if the person collecting the sample is inexperienced. Therefore, it is recommended that wide-mouth bottles be phased into service as part of the normal replacement of broken and lost bottles.

Item 2 and 4 Collection Procedures and Transportation and Storage

Each sample sheet should contain complete information relating to the sample including date of collection and the exact location sampled. It is also suggested that a space be provided to enter residual chlorine values.

Instructions to sample collectors

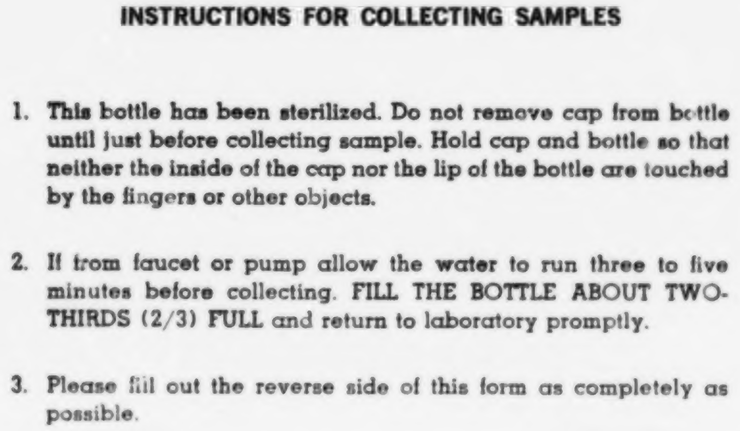
It is recommended that the instructions on the back of the State of Idaho Department of Health form DH 61271, figure 1, relating to the volume of sample to be collected, be changed. Presently the sample collector is instructed to fill the sample bottle two-thirds (2/3) full. Since the capacity of the sample bottle is 120 ml, the volume received for analysis would only be 80 ml and the minimum recommended sample volume is 100 ml. The present sample bottle could be marked to assure that a minimum of 100 ml is collected with ample space remaining for adequate shaking. Then samplers could be instructed to fill the bottle to this mark. It is also recommended that the last sentence in item 4 on the back of the State of Idaho Department of Health form DH 61058, figure 1, "If sample must be held for some time they should be refrigerated", be deleted. All samples should reach the laboratory within 30 to 48 hours after collection. Therefore it is suggested that sample collectors be instructed to coordinate sample collection and shipment with existing mailing and shipping schedules in their area.

Item 5 Record of Laboratory Examination

The procedure for reporting results of bacteriological analyses depends upon the type supply examined. All results are reported by mail unless a special request is made for telephonic notification. All results concerning municipal supplies are reported to the municipality and to the State Regional Engineer. A report is not sent directly to the Environmental Improvement Division in Boise. Results concerning private and semi-public supplies are sent to the purveyor or owner and to the County Environmentalist. The State Regional Engineer is not notified by the laboratory. If samples from private or semi-public supplies are unsatisfactory, a form letter, similar to Exhibit A, accompanies the report.

A semi-public supply is defined as one serving: (1) new subdivisions not yet included in municipal supplies, (2) schools, and (3) industries.

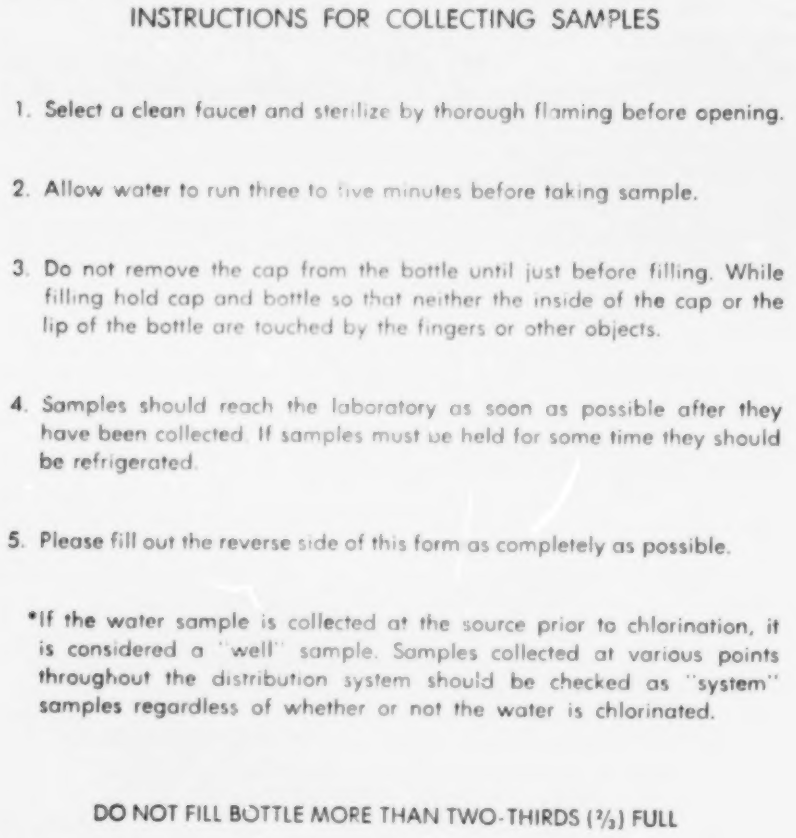
Basically there is no resampling program for remedial action when unsatisfactory samples are reported, Table 1. Regulations do recommend that unsatisfactory samples be reported and a program be initiated which provides for daily samples to be collected from the same sampling point and examined until the results obtained from at least two consecutive samples indicate that contamination is no longer present. Such regulations are outlined in the Public Health Drinking Water Standards, 1962, and the Surgeon General's memorandum to all State Health Officers, dated February 15, 1963.



INSTRUCTIONS FOR COLLECTING SAMPLES

1. **This bottle has been sterilized. Do not remove cap from bottle until just before collecting sample. Hold cap and bottle so that neither the inside of the cap nor the lip of the bottle are touched by the fingers or other objects.**
2. **If from faucet or pump allow the water to run three to five minutes before collecting. FILL THE BOTTLE ABOUT TWO-THIRDS (2/3) FULL and return to laboratory promptly.**
3. **Please fill out the reverse side of this form as completely as possible.**

Form DH 61271



INSTRUCTIONS FOR COLLECTING SAMPLES

1. Select a clean faucet and sterilize by thorough flaming before opening.
2. Allow water to run three to five minutes before taking sample.
3. Do not remove the cap from the bottle until just before filling. While filling hold cap and bottle so that neither the inside of the cap or the lip of the bottle are touched by the fingers or other objects.
4. Samples should reach the laboratory as soon as possible after they have been collected. If samples must be held for some time they should be refrigerated.
5. Please fill out the reverse side of this form as completely as possible.

*If the water sample is collected at the source prior to chlorination, it is considered a "well" sample. Samples collected at various points throughout the distribution system should be checked as "system" samples regardless of whether or not the water is chlorinated.

DO NOT FILL BOTTLE MORE THAN TWO-THIRDS (⅔) FULL

Form DH 61058 Figure 1

Instructions for collecting samples from municipal (DH 61058) and private and semi-public (DH 61271) water supplies

EXHIBIT A

CITY COUNTY HEALTH DEPT.
1455 North Orchard
BOISE, IDAHO 83704

Boise, Idaho CITY-COUNTY HEALTH DEPARTMENT Telephone 375-5211

CONTAMINATED DRINKING WATER

Laboratory examination of your water sample indicates that the water is contaminated with intestinal type of bacteria. This indicates that the water is polluted by organisms normally found in sewage and continued use may result in disease.

Corrective measures can be divided into two categories. The first is aimed at preventing surface water or other contaminating material from gaining access to the well, and the second is aimed at disinfecting the well.

OLD WELLS: These wells may be contaminated because of poor construction or because the source of water itself is contaminated. If the latter is the case, (usually shallow wells) little can be done to improve the situation except to have a well driller seal (case) off this shallow contaminated water and seek safe water at a greater depth. Dug wells commonly show contamination because it is almost impossible to keep out surface or seepage waters.

NEW WELLS: It has been our experience that new wells or recently repaired old wells and water systems commonly show contamination. This is because the materials used are ordinarily contaminated. Disinfection, as outlined below, will usually correct this trouble.

DISINFECTING WELLS

Wells may be disinfected by adding chlorine solutions, (Clorox, White Magic, Purex, etc.) or chlorine powders (H.T., B.K., Chloride of Lime, etc.) directly to the water in the well. About a quart of solution or 1/4 lb. of powder should be added to a 4-inch well but proportionately more is required for larger wells. Larger quantities may be required where unusual conditions are encountered. Add this material directly to the well itself in the evening and operate the pump until chlorine can be detected at all taps, then allow to set all night. Pump out the well thoroughly the following morning until no smell or taste of chlorine is left and sample again (for laboratory examination) on the following day. Sample bottles supplied by the Department of Health, Laboratory Services, should be used for this purpose. Periodic sampling should be done to be reasonably certain that the difficulty has been corrected.

ADA COUNTY HEALTH OFFICER

EXHIBIT A

When it is suspected that the water is contaminated because of poor design or construction there are a number of conditions to check.

1. Is the well deep enough to get satisfactory water? Water from shallow wells and pitcher pumps is always subject to contamination.
2. Is the well tightly cased? Make certain the casing is not perforated or cracked and that the joints are tight in the contaminated area or upper strata.
3. Is the well or casing tightly sealed at the top? This is important to keep out surface contamination and rodents.
4. Is the top of the well in a pit? This is a poor situation unless special protection is offered.
5. Is the surface drainage toward the well and are irrigation waters close? If so, these conditions should be remedied.
6. Are outdoor toilets, septic tanks, cesspools or sewer lines close to the well? If so, this is a definite hazard.
7. Is your well in lava formation where crevices may carry contamination great distances?
8. Are there other conditions which could contribute to the contamination of the water?

If you are still in doubt concerning the safety of your well or the quality of your water, write or call the City-County Health Department. We shall be glad to advise you or perhaps a sanitarian can call on you. After all, remember that a safe water supply is one of the foundations of good family and community health.

Table I

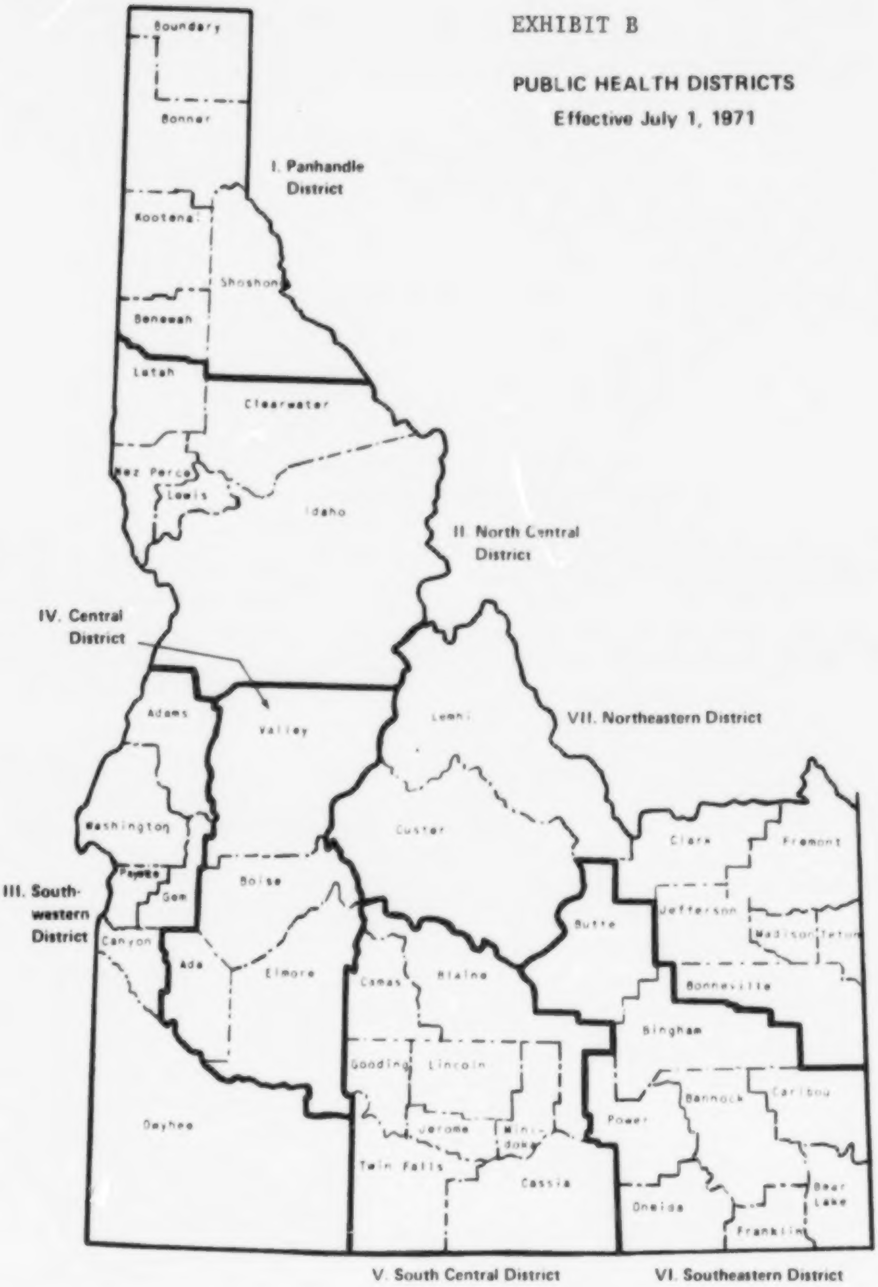
Resampling intervals on reported positive samples
January - October 1971

Name of municipal water supply sampled	Date collected	Date reported	Date resampled	Time interval for resampling
Bovill (three sampling points)	2/8	2/11	3/10	27 days
	2/8	2/11	none	
	3/10	3/15	5/12	approx 2 months
Craigmont (two sampling points)	7/23	7/28	8/2	5 days
	9/7	9/13	none	
Ferdinand (three sampling points)	7/26	7/30	9/20	52 days
	7/26	7/30	none	
	9/20	9/24	11/7	44 days
Millview Water Co. (two sampling points)	8/2	8/5	none	
	9/27	10/1	11/2	52 days
Stites (eight sampling points)	1/18	1/21	2/18	28 days
	1/18	1/21	none	
	5/17	5/20	6/21	32 days
	7/19	7/22	none	
	7/19	7/22	8/16	25 days
	8/16	8/19	9/20	32 days
	8/16	8/19	none	
	11/1	11/5	none	

EXHIBIT B

PUBLIC HEALTH DISTRICTS

Effective July 1, 1971


Boundary
Bonner
I. Panhandle District
Kootenai
Shoshone
Benewah
Latah
Clearwater
Nez Perce
Lewis
Idaho
II. North Central District
IV. Central District
Adams
Valley
Lemhi
VII. Northeastern District
Washington
Custer
Clark
Fremont
Payette
Gem
Boise
III. Southwestern District
Canyon
Jefferson
Madison
Teton
Butte
Ada
Elmore
Camas
Blaine
Bonneville
Bingham
Gooding
Lincoln
Caribou
Bannock
Power
Jerome
Minidoka
Twin Falls
Owyhee
Cassia
Bear Lake
Oneida
Franklin
V. South Central District
VI. Southeastern District

Item 12 Thermometers

The accuracy of all thermometers should be verified at temperatures within the minimum and maximum range of intended use by comparison with one certified by the National Bureau of Standards or one of equivalent accuracy. It is suggested that this service or such a thermometer be requested from the central laboratory in Boise.

Item 13 pH Meter

The pH meter was sent to the central laboratory in Boise approximately one month ago for repairs. During this time, media has not been checked for proper pH. It is recommended that the central laboratory provide a replacement when pH meters or similar instruments are being repaired. The pH of media is critical and must be monitored.

Item 31 Laboratory Water Quality

Distilled water used for bacteriological tests should be free of inorganic and organic substances either toxic or nutritive which may influence the survival or growth of microorganisms. In order to assure the quality, it is recommended that a distilled water suitability test be conducted at least once a year. This test can also be used to evaluate newly installed distillation apparatus, recently repaired or cleaned distillation equipment, and as a periodic check for loss of tin plating over a copper base of existing stills. This procedure for monitoring distilled water quality could also be done by the Central State Laboratory as a service to its regional laboratories.

Item 33 pH Measurements

A record of the pH, medium lot number, and date of preparation should be maintained on each batch of culture medium prepared. The minimal requirement is to maintain such a record for each new bottle of medium used. By monitoring final medium pH, a check can be made on possible errors in weighing, excessive heating or sterilization which could cause lactose hydrolysis, chemical contamination, or deterioration of ingredients that might occur during storage of the dehydrated medium.

Item 34 Sterilization of Media

It is suggested that liquid media containing carbohydrates be sterilized at 121°C for 12 minutes. This will reduce the chance of lactose hydrolysis resulting from excessive exposure of lactose to heat. Such hydrolysis produces glucose and galactose which can be fermented by non-coliform organisms causing false-positive reactions.

Item 48 Completed Test

The confirmed test can yield positive reactions in the absence of the coliform group (false-positive test). Therefore, it is necessary to establish the validity of the confirmed test by comparison with the completed test. The number of comparative procedures depends on the individual location and waters being examined. Approximately 20 comparative procedures each three months should be sufficient when there is good agreement. The number should be increased if results from the confirmed and completed tests differ. The completed test is the reference standard.

Item 50 MF Procedure

The filtration unit, funnel and receptacle, should be sterile at the start of each filtration series. Sterilization may be done by boiling, autoclaving, or ultraviolet radiation.

It is recommended that sterile buffered water be used to rinse the funnel after filtering the sample. The pH of sterile distilled water may have an adverse effect, especially on attenuated organisms, if the pH indicates that the distilled water is too acidic or basic.

Item 52 Counting - Verification of Coliform Colonies

Verification of coliform or suspected coliform colonies should be conducted by picking colonies and inoculating either lactose or lauryl tryptose broth and then transferring positive cultures to brilliant green lactose bile (BGB) broth. The present practice of picking colonies and inoculating directly into BGB broth should be discontinued because of the inherent lower recovery in more selective medium. Atypical colonies may be developing from attenuated coliform organisms and as a result the typical sheen will not be observed. Therefore, an enrichment procedure, inoculation into either lactose or lauryl tryptose broth, is required.

REMARKS

It is suggested that the Boise Central Water Laboratory assume the major responsibility for correction of deviations listed in items 2, 3, 4, 5, 12, and 13 because all purchasing authority is at the state level and the regional laboratories are entirely dependent upon the State Health Department for their needs and procedural guidelines.

PERSONNEL APPROVED

Mr. Jack Bennett, Microbiologist and Mrs. Sally Nick, Assistant Microbiologist are approved for the application of the multiple tube fermentation and membrane filter procedures for the bacteriological examination of drinking water for total coliform and the application of the multiple tube fermentation procedure used in stream quality measurements for total and fecal coliform.

CONCLUSIONS

The procedures and equipment in use at the time of the survey complied in general with the provisions of Standard Methods for the Examination of Water and Wastewater (13th edition - 1971) and the Interstate Quarantine Drinking Water Standards, and with correction of deviations listed, it is recommended that the results be accepted for the bacterial examination of waters under interstate regulations.

Harry D Nash

Harry D. Nash

APPENDIX D

CHEMICAL LABORATORY SURVEY

Survey of Water Chemistry Laboratory
Laboratory Division
Idaho State Department of Health
Boise, Idaho

Conducted by
Earl F. McFarren
Analytical Quality Control
Water Supply Programs Division

The offices of the Environmental Improvement Division in downtown Boise and the Public Health Laboratory on Warm Springs Road were visited on January 26 and 27, 1972. I was accompanied on this visit and introduced to the various personnel by Mr. William Mullen, Water Supply Consultant, Region X. Mr. Mullen, however, was able to stay only for the first day of the survey.

Substances Determined

The water laboratory routinely determines turbidity, chlorides, fluorides, nitrates, sulfates, total dissolved solids, copper, iron, lead, manganese and zinc as specified by the drinking water standards. In addition, they also routinely determine total solids, alkalinity, hardness, calcium, sodium, phosphate, silica and ammonia on potable waters even though these are not required. They generally never do color, odor, cyanide, carbon chloroform extract, surfactants, arsenic, barium, cadmium, chromium, selenium, silver, mercury, gross beta, radium 226, or strontium 90. Thus, in summary, although they routinely do twenty-three determinations, only eleven of these are required by the drinking water standards and fifteen substances specified in the drinking water standards are seldom, if ever, done. In addition, although, not at present specified by the drinking water standards, they have the capacity through the services of the EPA, Pesticides Community Study Laboratory located in the same building to do at least some water pesticide analysis, but none were done last year.

Laboratory Apparatus

Although they have the equipment for the determination of color (see item 6a of survey form) they do not routinely do this determination. Likewise, they have the equipment to do cadmium, chromium, and silver (item 8a); mercury (item 8c); barium (item 8b); arsenic (item 16); cyanide (item 17); and fluoride with distillation (item 18), but they do not do these determinations. Fluoride, however, is done by the direct colorimetric SPADNS procedure and is probably generally satisfactory.

However, since the electrode procedure is more accurate and free from interferences, it was recommended that they purchase an electrode. They do not have equipment for the determination of the carbon chloroform extract (item 19) or the determination of radium 226 (item 29a). Since carbon chloroform extraction equipment is not presently available, it was recommended that they wait until the new mini-sampler procedure and equipment becomes available.

Samples

While the sample identification form is generally satisfactory, the sample collectors are generally very careless in filling-in the required information and as a result many samples are poorly identified. In addition, there is no place to indicate whether the sample is a raw or finished water or whether a grab or composite sample (item 33b).

Records

A compilation dated January 1968, and listing the results of analysis of public water supplies was obtained from Mr. Vaughn Anderson's office, Director of the Environmental Improvement Division, but the latest results were dated 1966, and most were the results of even earlier analyses. However, Mr. Anderson did have in his files results of more recent analyses on many of the supplies. These have been key punched, but no recent print-out was available. Results of all municipal water supplies analyzed last year were available at the laboratory and a review of these files indicated that a total of 209 samples were analyzed last year. However, 50 of these were for fluoride only, and seven for iron and manganese only. Of the remaining 31 were analyzed for 20 substances and 121 for 23 substances. However, these 209 samples represented only about 46 different supplies, since 128 were wells (many of which were different wells in the same system). Nineteen of the samples were distribution samples and only 12 were from water supplies using surface water as a source.

According to Mr. Anderson there are about 300 municipal water supplies in the state, and about 20 of these have surface sources. However, from the above search of the records it appears that only about 35 or 40 ground water supplies and 10 or 12 surface water supplies were analyzed last year. Thus, in conclusion if, as a minimum, the surface water supplies are analyzed twice a year they should have done (20 x 2) 40, whereas they only did 10 or 12, and they should have analyzed at least one third of the 280 ground water supplies (once every three years) or about 95, whereas, they only did 35 or 40 (see item 36a). In addition, about 17 supplies are supposedly fluoridated, but a review of the records indicate that several were overfluoridated and most of the others were underfluoridated to the extent that it was useless. Since there is no other check on the fluoridated supplies these supplies should be analyzed at least once a week, which would mean about 884 (12 x 52) a year, whereas only about 200 were done. There is another problem, however, in that many of the supplies are wells scattered throughout the system and each well is separately fluoridated, so actually the total number should be much higher. In such cases, however, I wonder if it really is practical to attempt fluoridation. The City of Boise, for example, has 37 wells which would need to be separately fluoridated and checked during peak consumption periods in the summer time.

Other problem areas, as indicated from a review of the records, which may require more or less continuous surveillance, are a few wells which produce waters with total dissolved solids over 500, or nitrates over 40, and others with high iron and manganese values which causes difficulties in the operation of water heaters and boilers.

Laboratory

The water chemistry laboratory which is responsible for analysis of both polluted and potable waters, consists of one 2 module (about 20 by 20) and a one 1 module laboratory (about 10 by 20) which also serves as an office for the chief chemist. Although these laboratories are perhaps adequate for the three people which at present occupy them, they do not allow for an expansion of either the number of persons or an increase in activity. Even now there is inadequate storage space for chemicals and glassware, and no separate space for storage and handling of sample bottles.

Quality Control

The laboratory does routinely check the quality of their distilled and deionized water, but otherwise, has no routine program for checking the quality of their analyses (item 42).

If the laboratory desires to be certified for analysis of those chemistries which they are now running routinely, it will be necessary for them to establish their proficiency by analyzing a reference sample which we can supply.

Staff

The water chemistry staff consists of a chief chemist (Merle Maxwell) who has a masters degree in chemistry, an assistant with a bachelor's degree in biology (with some training and experience in chemistry), and a technician. In general, the salaries of all appear to be low, and the number is inadequate to carry out the desired chemistries with the desired frequencies. In addition, another person is needed on Mr. Anderson's staff to be in charge and responsible for carrying out an effective water supply program.

Conclusions

The water chemistry laboratory routinely analyzes for 23 substances, however, only 11 of these are required by the drinking water standards, and 14 substances that are in the standards are seldom if ever run.

The laboratory analyzed about 35 or 40 ground water supplies and 10 or 12 surface water supplies last year, whereas, even as a minimal operation they should have analyzed at least 95 ground water supplies and 40 surface water supply samples.

About 17 water supplies are supposedly fluoridated and hence, as a minimal operation the laboratory should have analyzed about 884 samples for fluoride, whereas, they did only about 200. The results of analyses indicate the need, since a review of the records revealed that a few were overfluoridated and most of the others were underfluoridated to the extent that it was useless. In order to increase the accuracy of the analysis, it is recommended that the laboratory purchase a fluoride electrode, since they are at present using the SPADNS procedure without distillation.

The equipment is available so that all of the chemistries specified by the drinking water standards, except the carbon chloroform extraction and radium 226, could be carried out, however, more personnel would be needed to carry out these additional chemistries and the desired increase in sampling. At least two additional persons (one chemist and a technician) are needed in the laboratory and an additional person to be responsible for carrying out an effective water supply program is needed in the Environmental Improvement Division.

There already is inadequate storage space for chemicals and glassware in the laboratory, and no place is provided for receiving and shipping or storage of samples and sample bottles. If additional personnel are hired, more laboratory space also will be required.

Salaries of all laboratory personnel appear to be low.

Earl F. McFarren

Earl F. McFarren

SURVEY OF WATER CHEMISTRY LABORATORIES

ENVIRONMENTAL PROTECTION AGENCY
Office of Water Programs
Water Hygiene Division

Indicating conformity with the 13th edition of Standard Methods for the Examination of Water and Wastewater (1971).

Survey by Earl F. McFarren
Date 1-26-72

X = Deviation U = Undetermined
O = Not Used

Laboratory Public Health Laboratory
Street Warm Springs Road
City Boise State Idaho
Director Dr. Darrell W. Brock
Chief Chemist Merle Maxwell
Water Supply Chief Vaughn Anderson

Substances Determined

1. Physical determinations

	Method	
a. color		X
b. odor		X
c. turbidity	nephelometric	

2. Miscellaneous anions, organics and solids

a. chlorides	mercuric nitrate titration	
b. cyanide		X
c. carbon chloroform extract		X
d. fluorides	SPADNS without distillation	
e. nitrates	ultraviolet spectrophotometric	
f. sulfates	turbidimetric	
g. surfactants		X
h. total dissolved solids	gravimetric at 103°	
i. other		

3. Metals

a. arsenic		X
b. barium		X
c. cadmium		X
d. chromium		X
e. copper	atomic absorption	
f. iron	atomic absorption	
g. lead	atomic absorption	
h. manganese	atomic absorption	
i. selenium		X
j. silver		X
k. mercury		X
l. zinc	atomic absorption	
m. other		

4. Radioactivity
   a. gross beta X
   b. radium 226 X
   c. strontium 90 X
   d. other

5. Pesticides
   a. aldrin O
   b. chlordane O
   c. dieldrin O
   d. DDT O
   e. endrin O
   f. heptachlor O
   g. heptachlor epoxide O
   h. methoxychlor O
   i. lindane O
   j. toxaphene O
   k. total organic phosphates plus carbamates O
   l. chlorinated phenoxy alkyl pesticides O
   m. other

Laboratory Apparatus

	Make	Model	
6. Color comparators			
a. visual	Taylor	disc comparator	X
b. filter photometer			
7. Spectrophotometer			
a. visible	Beckman	Model B	
b. flame	Beckman	Model B	
c. other	Beckman UV and Visible	DK2A	
8. Atomic absorption spectrophotometer			
a. air-acetylene burner		PE303	X
b. nitrous-oxide burner		PE303	X
c. cold-vapor (flameless)		PE303	X
d. argon-hydrogen flame		PE303	
9. Gas chromatographic equipment			
a. electron capture	Tritium and Nickel 63	Micro-Tek	
b. flame ionization			
c. flame photometric	Micro-Tek	Sulfur & Phosphorus	
d. microcoulometric	Dohrman	100	
e. other	Coulson conductivity		

Laboratory	Location	Date
Public Health Laboratory	Warm Springs Road Boise, Idaho	1/26/72

	Make	Model	
10. Other chromatographic equipment			
a. thin-layer	Yes		
b. Kuderna-Danish evaporator	Yes		
c. other			
11. Turbidimeter	Hack	2100	
12. Amperometer			O
13. Titrimeter			O
14. pH meter	Radiometer, Beckman expanded scale,	Corning	
15. Fluoride electrode			O
16. Arsine generator	have		X
17. Cyanide still	have		X
18. Fluoride still	have		X
19. Carbon-chloroform extraction equipment			
a. high or low flow columns			X
b. carbon drying oven			X
c. extraction apparatus			X
d. manifold for solvent evaporation			X
20. Drying oven	Precision		
21. Steam bath	Precision		
22. Hot water bath	Yes		
23. Muffle furnace	Yes		
24. Distilled water still	Two 10 gallons per hr.	Barnstead	
25. Water deionizer	mixed bed, large cartridge		
26. Conductivity meter	Wheatstone bridge, and YSI		
27. Balance, sensitive to 0.1 mg	Three Mettler balances		
28. Automatic analyzer for			
a. nitrates plus nitrites			O
b. nitrites			O

			Make	Model	
28.	Automatic analyzer for (Continued)				
	c.	chloride			O
	d.	sulfate			O
	e.	cyanide			O
	f.	fluoride			O
	g.	other			
29.	Radiation Counting Equipment				
	a.	internal proportional counter	Beckman,	Wide-beta II	O
	b.	alpha-scintillation counter			X
	c.	other	gamma scan	Radiation Instruments	O
30.	Other Instruments or Equipment				
	a.		Kjeldahl		
	b.		BOD		
	c.		COD		
	d.				

Samples

31. Containers

a. Non-reusable plastic containers preferred for the collection of samples for general inorganic analysis. . . . . ______

b. Glass bottles with teflon lines caps preferred for collection of pesticide samples . . . . ______

c. Other kind . . . . nalgene, reuseable . . . ______

32. Preservatives

a. Samples for metal analysis preserved by the addition of nitric acid to a pH of about 2.0 . . . . O

b. Nitrates and methylene blue active substances preserved by addition of mercuric chloride . . . . O

c. Cyanide preserved by the addition of sodium hydroxide to a pH of 11. . . . . O

d. No known or required preservative for turbidity, color, pH, chloride, sulfate, fluoride, specific conductance and total dissolved solids. . . . . ______

e. If no preservative is used, in general samples are analyzed within 72 hrs., if not samples are frozen. . . . . . ______

Laboratory	Location	Date
Public Health Laboratory	Warm Springs Road Boise, Idaho	1/26/72

33. Identification

  a. Every bottle should be identified by attaching an appropriately inscribed tag, a label or a number corresponding to a sample identification sheet. . . . . ____

  b. The minimum information required on the tag or correspondingly numbered sheet includes; name of the water supply sampled, location of sampling site, exact date and time of collection, type of sample (raw, finished, grab or composite) by whom collected, and kind of preservative if added X

34. Collection

  a. Samples from wells collected after pumping for a sufficient time to assure that the sample is representative of the ground water which feeds the well. . . . . U

  b. Finished (treated) water sampled at the plant by use of a pipeline drip device or the collecting and compositing of hourly (or other interval) samples . . . . U

  c. Distribution samples obtained at several different points in the system; usually grab samples obtained without first flushing the line, although both kinds of samples may at times be desirable. . . . . U

Records

35. Availability

  a. Assay results assembled and available for inspection . . . . ____

  b. Notation made of those water supplies which did not comply with one or more standards, and some sort of follow-up program instigated . . . . ____

36. Number analyzed annually

  a. private supplies ____ U

  b. semi-public ____ U

  c. municipal 46 supplies analyzed last year X

    (1) sources 128 wells (35 or 40 supplies) X

    (2) finished 12 from rivers, lakes or springs X

    (3) distribution 19 ____

37. Frequency

a. Physical characteristics measured at least once a week and preferably every day at the treatment plant. X

b. Chemical characteristics determined at least once every three years on ground water supplies and semi-annually on surface water supplies unless previous data has indicated a potential problem which needs to be monitored more frequently X

Laboratory

38. Physical facilities

a. Bench top area adequate X

b. Sufficient cabinet space for chemicals and glassware X

c. Adequate hood space. . . . . ______

d. Office space available for record keeping and processing reports X

e. Space for storage and handling of bottles. X

39. Glassware

a. Thoroughly washed with suitable detergent and warm water . . . ______

b. Rinsed immediately in clean tap water to remove detergent . . . ______

c. Final rinse with distilled water. . . . . ______

d. Dichromate cleaning solution used for difficult to clean glassware. . . . . ______

e. Glassware used for pesticide analysis should receive a final rinse with A. R. grade acetone or ethyl acetate . . . . . . ______

40. Organization

a. Total number of laboratories examining water 1 . . . . ______

b. Water laboratory is a separate unit, and not part of a food, drug, or toxicological laboratory X

c. Each of the other regional laboratories have the same capabilities. . . . . ______

d. Radiation chemistry is a part of the water laboratory X

Quality Control

41. Laboratory water quality

a. Conductivity of water checked at regular intervals . . . . ______

b. Use of deionized water for metal analysis . . . . ______

Laboratory	Location	Date
Public Health Laboratory	Warm Springs Road Boise, Idaho	197 1/26/72

42. Control Samples

a. A control sample of known composition (in addition to any necessary standards) is analyzed every time one or more unknown samples are analyzed.	X
b. A control sample is available and used for each substance specified in the drinking water standards	X
c. A control chart has been constructed for each substance, and the precision of each determination has been calculated	X

43. Reference Samples

a. Accuracy and ability of laboratory to perform each analysis checked by requiring them to analyze an unknown reference sample(s) supplied by the surveying office or laboratory at least once a year	X

Staff

44. Personnel

a. Total number of staff 3	X
b. Number with degrees in chemistry 1	X
c. Does state operate under a merit system.	
d. Are job descriptions written	
e. Does state encourage attendance at professional meetings, short courses, etc.	

45. Salaries

a. Chief chemist $11,972	X
b. Assistant chemist $8,076	X
c. Aids $5620	X

APPENDIX E

MANPOWER NEEDS AND COST ESTIMATES FOR WATER SUPPLY ACTIVITIES

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MANPOWER NEEDS AND COST ESTIMATES FOR WATER SUPPLY ACTIVITIES

Engineering Surveillance

Environmental Protection Agency experience indicates that on the average, at least four man-days per year are required to provide review of plans and specifications, meetings with governing bodies, field surveys, report writing, review of operational and water quality reports, and informal on-the-job training. Cross-connection control activities are excluded from this estimate as this activity is the responsibility of the purveyor. However, it is estimated that surveillance for cross-connection control in the smaller Idaho communities may be accomplished by the regional engineer within the four day allocation. Average annual estimated personnel cost for the above activities is $20,000[1]. This figure includes salary, fringe benefits, travel, office supplies and space, and the cost of 1/3 secretary.

Assuming a man-year is equal to 225 man-days, one individual can provide surveillance over (225 man-days per year/4 man-days per system) = 56 systems/year. The average cost per system for engineering surveillance is ($20,000/56) = $335 per year.

The known number of public water supplies in Idaho is currently 274. Early indications from the water supply inventory in progress is that this number will increase significantly.

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[1] All cost estimates and calculations are rounded to nearest $1,000.

However, for the purposes of these calculations a figure of 274 public water supplies was used. On this basis, the following annual personnel requirements and cost estimates for engineering surveillance are:

A. Personnel:

1. Professional:

   (274 systems) X (4 man days/system) = 1100 man-days

   (1100 man days) / (225 man days/man year) = 4.9 man-years

2. Clerical:

   (4.9 man-years professional) X (1/3 clerical/professional) = 1.6 man-years

B. Cost:

   ($355/system) X (274 systems) = $97,000

Training

Two types of training, State staff and waterworks operators, are considered with the following assumptions. Each professional should receive 5 days training per year at an estimated cost of $100 per day to cover tuition, travel and per diem. On the basis of each professional providing surveillance over 56 systems, the cost of training State staff is ($500)/(56) = $9 per system.

Assume also that utilities or operators are responsible for entry level training, that the State will adsorb the cost of short-term training to update operator skills and knowledge of new regulations, and that one operator per system receives on the average one day of training per year. The cost to the State is estimated to be $60 per system per year with 0.5 man-year professional staff allocated to coordination of the training program.

The annual personnel requirements and cost estimates per system for training are:

A. Personnel: 0.5 man-year professional staff
0.2 man-year support staff

B. Cost:

($9/system) + ($60/system) = $69/system

($69/system) X (274 systems) = $19,000

Standards Revision & Planning

Revision of existing standards and regulations, development of new standards and policy, establishment of program plans, and coordination of activities are essential to a well administered program. Resource expenditures for these water supply activities are estimated at 0.6 man-year professional staff, 0.2 man-year support staff, and $12,000 annually.

Bacteriological Surveillance

Bacteriological analyses are considered an operational expense of the utility. The State is responsible for performing a minimum number of check sample analyses and for conducting periodic surveys of laboratories. Assume the State will examine from each system 5% of the distribution system samples required by the drinking water standards, or two samples, whichever is greater. On the basis of population served by the 274 public water supplies and the minimum number of bacteriological samples required for each supply, the estimated number of bacteriological samples to be analyzed by the State laboratories in Idaho is 7000 per year. Assuming a cost of $5 per bacteriological sample, including postage, the estimated cost to the State for bacteriological sampling is $35,000 per year.

An additional aspect of the program is laboratory surveillance. It will be necessary to certify triennually all laboratories used by the utilities for bacteriological analyses. Assume the need for surveillance of five state laboratories and five utility or private laboratories. Many of the medium size communities may elect to reimburse the State for analyzing their samples in State laboratories. Environmental Protection Agency experience indicates the cost of triennial surveillance of State bacteriological laboratories to be $130 per laboratory per year. Small laboratory costs are estimated at $85 per year. The estimated cost for laboratory certification is approximately $1000 per year.

Total State cost for bacteriological surveillance is estimated to be $36,000 per year.

Chemical Surveillance

Chemical analyses for proper operational control as well as special analyses for contaminants known to be present at levels approaching established drinking water limits should be performed routinely by the utility. The State is responsible for sufficient sampling to insure that water of satisfactory chemical quality is delivered to customers of public water supply systems. Environmental Protection Agency experience indicates the following laboratory personnel requirements (man-days per sample) for various analyses: wet chemistry parameters, 1.8; trace metals, 0.4; pesticides, 0.8; organics, 0.6; radiochemical, 0.6. Estimated personnel costs including salary, equipment, supplies and secretarial support are $20,000 per man-year.

Of the 274 known public water supplies in Idaho, approximately 45 utilize surface or a combination of ground and surface water. Assuming that each supply utilizing solely ground water requires a wet chemistry, trace metals, and radiochemically analysis triennially and each supply utilizing surface water or combination ground and surface water requires a complete chemical analysis annually and radiochemical analysis triennally, the resource requirements for an adequate chemical sampling program are:

A. Personnel:

1. Surface Supplies:

   (45 surface supply samples) X (1.8+0.4+0.8+0.6+(0.6/3) man-days per samples) = 171 man-days

2. Ground Supplies:

   (229 ground supply samples) X 1/3(1.8+0.4+0.6 man-days per samples) = 214 man-days

3. Total Estimated man-years for chemical analyses:

   (171 man-days + 214 man-days)/(225 man-days per year) = 1.7 man-years

B. Cost:

(1.7 man-years X ($20,000/man-year) = $34,000

It is anticipated in Idaho that in the foreseeable future only the State laboratory will have the staff and equipment to analyze wet chemistry, trace metals, pesticide, organic and radiochemical samples. Occasionally a contract laboratory may be called upon by a public water supply for chemical analyses. There may be no more than 6 or 7 laboratories in the State and, therefore, the annual cost of chemical laboratory surveillance in Idaho will be low. Based on Environmental Protection Agency experience, the cost of certification of chemical laboratories is approximately $390 every 3 years or $130 annually. The estimated cost of the chemical laboratory evaluation and certification program will be less than $1000 per year.

State cost for chemical surveillance is estimated to be $35,000 per year.

Management and Overhead

Personnel costs and supervisor salaries are estimated to be 20% of the surveillance, training and program development costs. This does not include costs for centralized services such as accounting, purchasing, etc. The estimated annual management and overhead costs for Idaho's water supply program are:

20% (Engineering Surveillance + Training + Standards Revision and Planning + Bacteriological Surveillance + Chemical Surveillance)

20% ($97,000 + $19,000 + $36,000 + $35,000)

.20 ($199,000) = $40,000 per year